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# The Health and Physique of School Children

BY

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**With an Introductory Note by the Director of the Ratan Tata Foundation**

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# PREFACE.

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In the autumn of 1910, an enquiry into the heights and weights of public elementary school children was commenced in the Economics Department of the Huddersfield Technical College by Mr. George H. Wood, F.S.S., based on the records contained in the annual reports of School Medical Officers. At a later stage, owing to the huge mass of material which came to hand, I began to take part in the investigation. Subsequently, Mr. Wood felt compelled to relinquish the work, which was then left solely in my hands. It should be stated that the statistical method used in the enquiry was introduced by Mr. Wood, to whom the investigation obviously owes much in many ways.

The scope of the study has been made wider than was originally intended, by the inclusion of the matters dealt with in Chapters IV. and V. It is hoped that the statistics obtained in other investigations, which have been brought together in Appendix C, will be useful for reference.

I have been content in the main to allow the statistics to speak for themselves, though I have not hesitated to express my opinion in favour of a great development of the school medical service and its agencies of prevention, the outcome of which will be, I believe, the introduction of far-reaching changes in the curriculum, organisation, and general outlook of the elementary school.

I have already referred to the debt I owe to Mr. Wood; in addition, I have to thank him for reading through the proofs. I wish to thank those School Medical Officers who

have been good enough to furnish me with their reports, and Miss B. L. Hutchins, who has consulted reports for me at the library of the Board of Education. I am also very grateful to those of my students who have so ungrudgingly given time and effort to the detailed statistical work of the enquiry. Lastly, I beg to thank the Ratan Tata Foundation for their offer to undertake its publication.

ARTHUR GREENWOOD.

# INTRODUCTORY NOTE.

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SINCE the passage of the Education (Administrative Provisions) Act of 1907 we have been accumulating a steadily-growing body of information with regard to the physical condition of children attending the elementary schools. Every year a summary of the discoveries made in the course of medical inspection appears in the Annual Report of the Chief Medical Officer of the Board of Education. But the greater part of them lies buried in the reports of school medical officers. The object of the following pages is to make their main results accessible to the general public, to appraise the value of the evidence which they offer as to the physical condition—good or bad—of the school children of England and Wales, and to indicate how they may be used to throw light on the nature, degree, and causes of ill-health in the elementary schools—a matter the importance of which can scarcely be exaggerated, but which has only recently begun to receive any considerable amount of attention. No lengthy argument is needed to prove the gravity of a state of affairs about which the Chief Medical Officer of the Board of Education can say that "of the six million children registered on the books of the Public Elementary Schools of England, about 10 per cent. suffer from a serious defect of vision, from 3 to 5 per cent. suffer from defective hearing, 1 to 3 per cent. have suppurating ears, 6 to 8 per cent. have adenoids or enlarged tonsils of sufficient degree to obstruct the nose or throat and to require surgical treatment, about 40 per cent. suffer from extensive and injurious decay of the teeth, about 30 to 40 per cent. have unclean heads or bodies, about 1 per cent. suffer from ringworm, 1 per cent. from tuberculosis in readily recognisable form, from 1 to 2 per

cent. are afflicted with heart disease, and a considerable percentage of children are suffering from a greater or less degree of malnutrition." Such a statement is likely to be read in the future with the sensation aroused to-day by a study of the reports of the early Commissions on Child Labour in Factories and Mines; and even those who find themselves in disagreement with some of the proposals from time to time put forward for coping with disease among school children, will probably be glad to have the facts presented to them in a form which can easily be grasped. Whatever views may be held as to the causes or remedy of the serious evils revealed by medical inspection, the first condition of reform is that the nature of those evils should be widely known.

Naturally, Mr. Greenwood's researches are neither completely exhaustive in their scope nor altogether original in their conception. His figures relate to only about one-seventh of the children attending the elementary schools of England and Wales; and the reader will be reminded in examining them of similar inquiries carried out in the past, of which the best known is probably the report issued in 1883 by the Anthropometric Committee of the British Association. The development of medical inspection has, however, supplied him with materials which previous inquirers did not possess, and of these, it will be agreed, he has made good use. How much more extensive his survey is than that of the British Association may be judged from the fact that, whereas the latter dealt with between 42,000 and 43,000 individuals, Mr. Greenwood's figures represent about 800,000, and that the number at some ages exceeds the total number on which the Report of the British Association's Committee was based. The results of so comprehensive an inquiry, are, of course, open to varying interpretations: not every one, for example, will agree with his explanation of the approximation between the statures of "poor" and "more prosperous" children which appears to take place in the later years of school life. But they are not likely to be seriously modified by the mere addition of similar statistical information. Judged from a quantitative point

of view, his investigations may claim to be not only the most complete which have yet been made, but sufficiently complete to yield reliable data for the school medical officer, the educationalist, and the citizen who is anxious to go behind educational machinery and visualise the actual conditions of the children for whom elementary education is provided.

A survey of this kind is necessarily concerned rather with the presentment of facts than with their interpretation, since an exhaustive examination of the points of interest which arise would require a series of separate monographs. Pending the appearance of such detailed studies, there is much to be learned from a general picture of the physical condition of school children, such as is offered by Mr. Greenwood. The familiar contrast between the physical conditions of the "urban" and "rural" population is brought out very clearly in Table VII.; it will be seen that in a group of eight County Council areas where it is possible to discriminate between "urban" and "rural" children the index number of the former is 100·5, while that of the latter is 102·4. The curves contained in Chart II. in illustration of the percentage annual growth of school children, and the comparison which the Tables on pp. 27–28 enable to be made between the height and weights of children in different areas, should be useful as offering an index by means of which an Education Authority can judge whether the children under its care are above or below the average of children in other parts of the country. In making such a comparison care must be taken to select for the purpose districts which are not too dissimilar in industrial character, a selection which the long list of areas given in Appendix A should in most cases render practicable. When the children in one industrial area are markedly inferior in height and weight to not only the average for the whole country, but to the average of other industrial areas, there would appear to be at any rate a case for inquiry into the cause of the disparity. The Tables and Charts on pp. 29–33 and 57–58 are interesting as throwing light on the much-discussed problem of the effect upon the

physique of children of Partial Exemption ("half-time employment"). Doubts have sometimes been expressed as to the reality of the harmful effects ascribed to it, and it has been questioned whether children prohibited from working half-time would not lose more on account of insufficient nourishment than they gained through prolonged attendance at school. The comparison of heights and weights in towns where there is much, and towns where there is no half-time, of the heights and weights of half-time and full-time scholars, of heights and weights in Bradford and certain other towns, supply weighty evidence for holding that the effects of partial exemption on the health of children are as disastrous as are the effects of the system upon their elementary education and (often) upon their subsequent careers.

Equally striking in another way are the figures on pp. 34–37 and pp. 64–66. The contrast contained in the former between the heights and weights of "poor" and "more prosperous" children suggests, what can be shown by other evidence to be true, that the poverty of a group in one generation acts with cumulative effect in dragging down the standard of life of its descendents in the next generation, and thus, in the absence of counteracting causes, perpetuates itself. The latter aim at supplying a concrete specimen of the operation of such counteracting causes by comparing the elementary school children of Bradford in 1908, 1909, 1910, and 1911 in respect (*a*) of weight, (*b*) of certain other characteristics indicative of good or ill-health. Bradford, as is generally known, has devoted much thought and money to the improvement of the health of its school children. In 1908 it established both a school clinic and an open-air school. It is, therefore, highly satisfactory to see that the physical condition of the children appears to have responded to the care spent upon it. The average weight both of boys and of girls has grown appreciably, while the proportion of children classified as "healthy" is larger, and the proportion of children classified respectively as "neglected" and "anæmic" is smaller. That too much reliance must not be placed on a single instance of this kind goes without saying. The coincidence between the

improvement and the means taken to bring it about may possibly be fortuitous; nor must it be forgotten that the period of prosperity which the textile industries of Yorkshire have experienced since 1908 is likely to be reflected in improved nutrition among the children. It may, however, be said with safety that the experience of Bradford makes it most desirable that experiments similar to those which it has undertaken should be widely extended, and that careful records should be kept of their results. When brought into relation with the figures showing the decline in the physique of Bradford children at the age when half-time labour begins, these records of improvement suggest the urgent importance of concentrating attention on the lengthening of the period of school attendance, of restraining juvenile and adolescent labour, and of making the conditions in factories and workshops such as to be less likely than they are at present to inflict injury upon the young persons entering them. It is scarcely credible that the community will continue for long to be satisfied with improving the health of children while they are in attendance at school, only in order that it may be deteriorated by overwork and insanitary conditions as soon as they enter industry.

R. H. TAWNEY.

# THE HEALTH AND PHYSIQUE OF SCHOOL CHILDREN.

## CHAPTER I.

### INTRODUCTORY.

THE first serious attempt on a large scale to obtain statistical information regarding physical development in this country was made by the British Association, which appointed a committee in 1875 to make an anthropometric survey of the United Kingdom. This committee issued each year a report of its work, the final report being issued in 1883. It succeeded in obtaining measurements of 37,354 males and 4,616 females of all ages. There has been both before and since a number of smaller investigations, but a comprehensive survey was a matter of great difficulty. The work of Dr. Clement Dukes on the physical development of public school boys, of Dr. Wm. Hall on the comparative development of Jewish and Gentile children, and of the Dundee Social Union are well known. The Appendices to the Report of the Interdepartmental Committee on the Physical Deterioration, the report of Dr. Mackenzie and Captain Foster on the condition of Glasgow school children, the report on the physical condition of 1,400 school children in Edinburgh, and others, have furnished valuable information within the limited area of their operations.

In 1907 the Education [Administrative Provisions] Act laid upon the local education authorities in England and Wales the duty of providing for the medical inspection of public elementary school children, and it was laid down by the chief Medical Officer of the Board of Education "that

the most important features in the physical condition of the child should be systematically ascertained." In November of the same year the Board issued a Circular [No. 576] explaining the scope and purpose of the Act, and stating that, amongst other things, the recording of heights and weights of the children should form part of the routine of medical inspection. This, it may be assumed, was insisted upon, because of the intimate relationship between physical development and health. Circular 596, issued in August, 1908, sets forth the particulars which should be given in the annual reports of school medical officers, and includes " tables showing the height and weight of children inspected (according to age at date of inspection and sex)." These reports, therefore, have rendered it possible to undertake an anthropometric survey on a much larger scale than formerly. Not only do these documents contain statistical information regarding heights and weights, but they are becoming increasingly valuable for the light they throw upon many aspects of juvenile physique—eyesight, condition of teeth, nutrition, personal cleanliness, and the like. Some medical officers have made chest measurements, others have classified the children according to social class, or housing accommodation ; and on the whole a vast amount of useful investigation into the health and physical development of the child population is being carried on. But much of this matter, important as it may in time become for future enquiries, is not at present always quite in a form which can be utilised for comparative purposes, and for compilation into homogeneous groups for the whole country, while a good deal of available information, *e.g.* regarding nutrition, is practically useless because of the absence of an absolute standard.

The present enquiry therefore, owing to the unsatisfactory character or insufficient amount of the information relating to juvenile physique, deals mainly with heights and weights, and relates solely to elementary school children who have been " medically inspected." The primary object has been:

(1) To determine the average height and weight of

the public elementary school children of England and Wales at each age from three to fifteen years.

(2) To compare the physique (as measured by height and weight) of children of one district with those of another.

(3) To enable school medical officers to compare the development of the child population of the same district at different periods.

In addition, the effect of disease on juvenile physique has been briefly considered.

In the future, when the school statistics take account of racial differences (by including observations of hair and eye colour, etc.) it will be possible to estimate more closely the effect of social conditions on physical development.

The investigation is based solely on the reports of school medical officers, who in accordance with the suggestion of the Board of Education, almost always include a table shewing the heights and weights of the scholars examined by them. The observation of stature and weight is not of course, undertaken purely for anthropometric purposes, but only as part of a wider scheme of medical supervision, the measurements being taken by the school doctors, by the headmaster, or by the teachers of classes. The statistics used to establish the table of average heights and weights relate to over 800,000 children, and have been obtained by the services of many thousands of school doctors and teachers. The question may arise, therefore, as to the accuracy of the observations. Speaking generally, a close examination of the reports of one town with another in the same district, and of one town at different years, seems to shew that the measurements are sufficiently accurate for the purpose in hand. There is little difficulty in recording heights and weights, and teachers as a class are, one may reasonably suppose, capable of performing the work quite well. The opinion amongst school medical officers appears to be that the records are carefully and accurately obtained. Apart from gross carelessness, there are two errors into

which it is probable that a number of observers may have fallen, in making their measurements. The first is to ignore fractions over a complete unit, making 3 ft. 4½ ins. appear as 3 ft. 4 ins.; or, on the other hand, to count a fraction irrespective of its size, as a complete unit, when 3 ft. 4⅜ ins. would figure as 3 ft. 5 ins. It has been assumed that these errors cancel each other, or that if there is a balance either way it will have no appreciable effect on the final result.

The Board of Education requires school medical officers to examine all "entrants" and "leavers," the former class consisting mainly of children from three to six years of age and the latter of scholars between twelve and fourteen. The Board has also suggested the inspection of children in some intermediate group, and in 1910 about a hundred local authorities undertook this task. A number of authorities have made an examination of all the children on the roll and nearly all arrange for the examination of "special" cases when the doctors visit the schools for the purpose of inspecting entrants and leavers. These "specials" consist of ailing and defective children. It is possible, therefore, that the inclusion of this specially selected class might depress the average height and weight at ages intermediate between the ages of entrants and leavers. A large number of "specials," however, are suffering from defects which have little or no adverse influence on physique, such as defective eyesight and hearing. Of the remainder, the number is most probably not sufficient to exert any appreciable effect on the average for the country as a whole.

The reports upon which the enquiry is based, were those for 1908, 1909 and 1910, though they include a few for 1911, and they spread more or less unevenly over the whole country A perusal of Appendix A will show the scope of the matter used.

A large number of the reports state quite clearly the conditions under which the children were weighed and measured. The usual method is to take heights without boots, and weights in ordinary indoor clothing. Where

there were grounds for supposing that these conditions were not observed the figures were rejected, so that all heights are assumed to have been measured without shoes and all weights taken in indoor clothing.

In some reports the average height and weight at each age was given, but not the number of children at each age. Such figures could not be included in determining the final average, though they were admissible for comparison with those of other areas. In certain cases the tables given in the reports were useless for the purpose, as, for example, where the average height and weight of all children under five, or between five and eight, are stated without any indication as to the average at each year of age; and also where boys and girls are not distinguished.

## CHAPTER II.

### THE METHOD OF WORKING.

THE method of working adopted was as follows. The tables given in the school medical officers' reports relating to height and weight were standardised and copied on to separate sheets. Where particulars of an area were given and also those of the districts composing it, the latter figures were taken, *e.g.*, Hertfordshire was subdivided into Urban and Rural. The two groups were taken at each age and not the single group for the county as a whole; similarly with Merioneth, the separate districts were taken and not the county.

The particulars of boys' heights at each age were then transferred to other sheets, from which it was possible to obtain the total numbers at each height.* Boys' weights, girls' heights, and girls' weights were similarly treated and the arithmetical average and the median then obtained. This yielded the figures required regarding the height and weight of the school children of the country as a whole.

It may here be mentioned that the Enquiry was twice re-opened, owing to further material coming to hand, and though the numbers included were large, the average was not greatly disturbed. It is probable, therefore, that a new Enquiry, based on still larger numbers would not move the averages given below to any significant amount. The Anthropometric Committee's statistics included a group of about 16,000 males and about 3,200 females between the ages of three and fourteen years. It will be observed that some of the groups (for single years) dealt with in the present enquiry, are larger than the number used by the British Association Committee at all ages.

The comparison of district with district and town with town is a matter of some difficulty. Some of the groups

* For examples see Appendix B.

at particular ages are small, and their average height (or weight) abnormal as compared with other age groups in the same area ; to include them, therefore, for comparative purposes would be to depress or raise the final result unduly. Then also, as has already been pointed out, all ages of school life are not included in every report. The ages for which measurements are given may be five and thirteen, or five, eight and thirteen, etc. This renders it impossible, in many cases, to make an accurate comparison of the physical development of the children of different areas.

The object is to estimate the superiority or inferiority in height and weight of the school children of one district as a whole and at all ages, as compared with those of another district ; or to compare the physical development of the scholars of the same area at different times.

The best method of comparing the weight of the boys of A with the weight of the boys of B would, of course, be as follows :

Let W = weight, and *n* the number at each age.

$$\text{Then } \frac{W_3 n_3 + W_4 n_4 + W_5 n_5 + \ldots . W_{13} n_{13}}{n_3 + n_4 + n_5 + \ldots . n_{13}} = \text{weight per child,}$$

and if the results were weighted for differences in age distribution, district could then be compared with district, and it could be said that on the whole the boys of A are heavier than the boys of B by *x* per cent. But complete statistics are not available, and even if those were utilised which were available, it would be impossible to allow for differences in the age distribution as the information could not be obtained. Where intermediate ages are not given they could be interpolated in one of two different ways. Working from the ages known, those missing could be calculated on the assumption that growth was regular ; or secondly, growth might be assumed to correspond with the yearly growth given in the report of the Anthropometric Committee of the British Association, or that given below.* The first way must be ruled out, because growth is not regular, so that the second method is the better one to adopt,

* P. 12, Table I.

provided the groups known are reliable, though it would necessitate a considerable amount of calculation.

After experiment, however, the device of the index number was used. First it may be said that for comparative purposes, ages three, four, fourteen, and fifteen were rejected partly because of the paucity of numbers usual at these ages, and partly because at three and four years of age, a difference of a few months makes an appreciable difference in growth, and, as the group of children of three (or four) would in some towns contain a large proportion who were nearly four (or nearly five), the averages would not be sufficiently reliable, so that we are concerned only with the ages from five to thirteen inclusive.

For each town or district, the average height (or weight) at each age was expressed as an index number, the average height (or weight) for the whole country at each age being taken as 100, thus :

BOYS' HEIGHTS.

| Age. | England and Wales. | Berkshire (C.C. Area). | Durham (C.C. Area). |
|---|---|---|---|
| 5 | 100 | 100·7 | 98·5 |
| 6 | 100 | 100·0 | 97·2 |
| 7 | 100 | 102·0 | 97·8 |
| 8 | 100 | 100·8 | 97·3 |
| 9 | 100 | 101·4 | 95·3 |
| 10 | 100 | 100·6 | 95·9 |
| 11 | 100 | 100·4 | 97·4 |
| 12 | 100 | 101·1 | 99·1 |
| 13 | 100 | 102·1 | 99·1 |
| Total . | 900 | 909·1 | 877·6 |
| Average | 100 | 101·0 | 97·5 |

According to the material available, therefore, the heights of the school children in the Berkshire County Council area are, on the whole, 1 per cent. above the height of the children

of England and Wales as a whole, whilst Durham County Council children fall 2½ per cent. below the average in height. The advantage of this method is that it may be applied independently of age distribution, provided the age groups are fair samples. The reliability of the result obtained from compounding a smaller number of years of age than nine will depend upon the number of years available and the number of children in each age group. Four, or even three, different years, if the groups are large and the averages coherent, will be fairly reliable. The actual method of working was to reject all groups containing less than ten children. The remainder of the index numbers for each age were then carefully scrutinised and abnormal figures rejected. *e.g.*, in the case of Dorset County Council averages of boys' heights are given for each year from five to thirteen, but at ages nine and ten the numbers were nine and eight respectively, and were therefore excluded. Of the remaining seven years, in the case of five, the index numbers stood over 100, but in one (at eight years of age) it was down at 95·6. This was rejected as abnormal, leaving six years of age from which to calculate the index number for height, as follows:

BOYS' HEIGHTS.

| Age. | Index Numbers. Dorset C.C. |
|---|---|
| 5 | 101·5 |
| 6 | 101·4 |
| 7 | 98·2 |
| 8 | [95·6—rejected] |
| 9 | Rejected—less than 10 boys. |
| 10 | ,, |
| 11 | 101·7 |
| 12 | 102·7 |
| 13 | 102·5 |
| Total (6 years) | 608·0 |
| Average .. | 101·3 |

A certain amount of variation has to be allowed in the index numbers and, generally, height numbers which deviated more than about 3 per cent. from the majority of the index numbers given were rejected, though other considerations were also taken into account. In the case of weights it was found that wider fluctuations must be allowed. Where for any district or town there were statistics for two or three years the index for each year was worked out separately, as well as for the two or three years taken together, and the results compared.

The method of the index number may be pressed further. Having obtained the index numbers for heights and weights of both sexes, the sum of the index numbers divided by four will yield an index number for physique (as measured by height and weight) thus:

| | England and Wales. | Middlesex C.C. | Edmonton. |
|---|---|---|---|
| Boys' heights .. | 100 | 101·0 | 98·1 |
| ,, weights .. | 100 | 101·5 | 96·7 |
| Girls' heights. .. | 100 | 101·3 | 98·7 |
| ,, weights .. | 100 | 101·0 | 97·5 |
| Total .. .. | 400 | 404·8 | 391·0 |
| Average. .. | 100 | 101·2 | 97·8 |

This final index number may be utilised as a means of comparing the children of different districts or children of the same district at different times. Other methods of comparison, possibly superior, are of little actual use to the school medical officer and others owing to their complexity.

The simplest standard is undoubtedly the weight in pounds divided by the height in inches, *i.e.*, pounds weight per inch of height, though it is not very satisfactory as a means of measuring physical development or the state of nutrition. A small, puny child and a tall, well-built boy of the same age may yield the same value for $\frac{W}{H}$. On the

other hand, the relatively fat boy will come out with a high value for $\frac{W}{H}$ as compared with the average. This formula, however, may be extremely useful for comparing the physique of children in the same town at different times, but it is of little service for comparing different groups of children at the same time. The value of $\frac{W}{H}$ for each age for both boys and girls has been calculated and is given below.*

A modification of this method, which, however, is open to the serious objection that it lacks simplicity, is that referred to by Dr. Kerr in his London report for 1910. A method of evaluation used on the Continent is a nutritional index derived from the percentage relation between the cube root of the weight in kilograms and the stature in centimetres.

$$\text{Index} = \frac{100 \sqrt[3]{\text{weight}}}{\text{stature.}}$$

The average value of this index is said at all ordinary school ages (eight to fourteen) to be between 2·3 and 2·4, and to be independent of racial influences."† This index has also been worked out for reference, and will be found set forth below.‡

One fairly simple standard of comparison (which, however, must be made for each age separately) is the percentage growth per year in height and weight respectively. This is probably independent of the racial factor, and may therefore prove to be of great service. It has been calculated for both sexes, and is given in the form of a table.§

* *See* Table III., p. 19.

† Quoted in the Report of the Chief Medical Officer of the Board of Education, 1910, pp. 31, 32.

‡ Table IV., p. 21.

§ Table V., p. 22.

# CHAPTER III.

## Some Results of the Investigation.

In the following table will be found the first results of the enquiry, viz., the average height and weight of boys and girls at each year of age, showing also the number of observations. The arithmetical average is given, and also a series of figures representing the median of the local means (weighted by the numbers of observations). From the material available it is, of course, impossible to calculate the real median, as the height and weight of each individual child are not available, the school medical officers' reports giving for their area only the arithmetical average of these individual heights and weights. It will be noticed, however, that the median obtained corresponds fairly closely with the average, the difference amounting in no case to more than about 1 per cent., and being generally much less.

### TABLE I.

Heights and Weights of the Elementary School Children in England and Wales.

Boys.

| | Heights (in inches). | | | Weights (in lbs.). | | |
|---|---|---|---|---|---|---|
| Age. | Total Number of Children. | Average. | Median. | Total Number of Children. | Average. | Median. |
| 3 | 12,069 | 36·46 | 36·4 | 12,266 | 32·91 | 32·9 |
| 4 | 33,240 | 38·63 | 38·6 | 33,200 | 35·77 | 35·8 |
| 5 | 98,560 | 40·68 | 40·7 | 97,268 | 38·68 | 38·5 |
| 6 | 28,916 | 42·83 | 43·0 | 29,219 | 42·24 | 42·2 |
| 7 | 47,391 | 45·04 | 45·0 | 46,439 | 46·40 | 46·6 |
| 8 | 17,896 | 47·39 | 47·4 | 17,856 | 52·00 | 52·2 |
| 9 | 11,582 | 49·18 | 49·1 | 11,430 | 55·90 | 55·9 |
| 10 | 27,775 | 50·84 | 50·9 | 27,654 | 60·35 | 60·3 |
| 11 | 10,732 | 52·98 | 53·0 | 10,489 | 66·41 | 66·5 |
| 12 | 47,784 | 54·88 | 55·0 | 45,978 | 72·66 | 73·0 |
| 13 | 76,407 | 56·07 | 56·0 | 77,595 | 77·40 | 77·3 |
| 14 | 6,841 | 58·16 | 58·2 | 6,827 | 84·00 | 84·3 |
| 15 | 436 | 60·72 | 60·9 | 443 | 94·14 | 94·5 |
| Grand Total—419,629 | | | | Grand Total—416,664 | | |

TABLE I.—*continued.*

GIRLS.

| | Heights (in inches). | | | Weights (in lbs.). | | |
|---|---|---|---|---|---|---|
| Age. | Total Number of Children. | Average. | Median. | Total Number of Children. | Average. | Median. |
| 3 | 11,111 | 35·95 | 36·0 | 11,118 | 31·68 | 31·6 |
| 4 | 30,959 | 38·39 | 38·2 | 30,983 | 34·98 | 34·9 |
| 5 | 95,103 | 40·44 | 40·4 | 93,769 | 37·74 | 37·6 |
| 6 | 29,426 | 42·53 | 42·6 | 29,394 | 41·24 | 41·0 |
| 7 | 44,504 | 44·76 | 44·6 | 39,943 | 44·93 | 45·0 |
| 8 | 17,621 | 46·94 | 47·0 | 17,187 | 49·55 | 49·8 |
| 9 | 11,379 | 48·71 | 48·7 | 11,543 | 54·09 | 54·0 |
| 10 | 26,716 | 50·60 | 50·7 | 26,361 | 58·69 | 59·1 |
| 11 | 10,709 | 53·01 | 52·8 | 10,605 | 65·52 | 65·1 |
| 12 | 44,784 | 55.48 | 55·6 | 44,128 | 73·86 | 73·9 |
| 13 | 72,710 | 56·81 | 57·0 | 74,195 | 80·37 | 80·4 |
| 14 | 6,102 | 58·93 | 58·8 | 5,996 | 88·11 | 88·9 |
| 15 | 510 | 60·26 | 60·3 | 498 | 96·24 | 97·8 |
| | Grand Total—401,634 | | | Grand Total—395,720 | | |

The total number of height observations is 821,263, and of weight observations, 812,384.

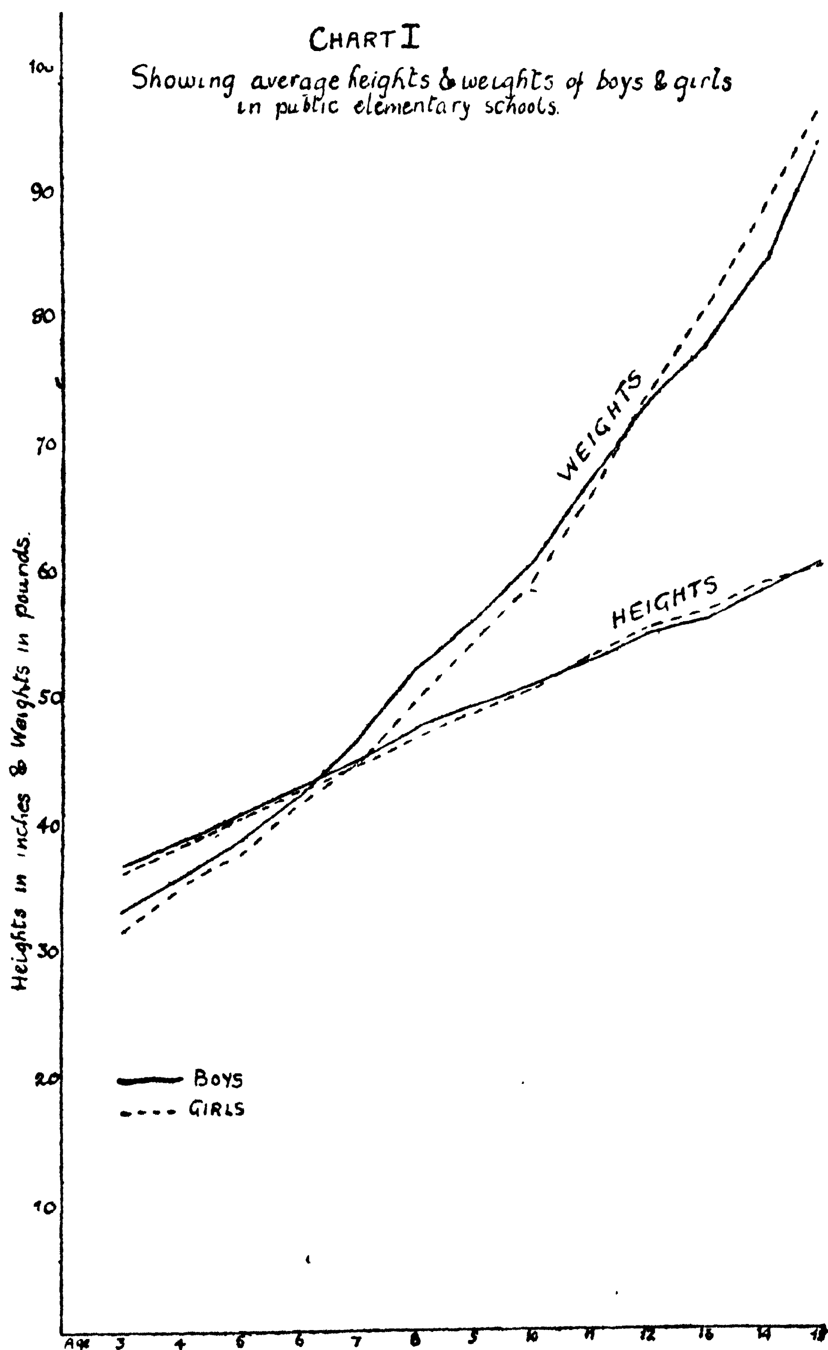
The total number of children on the registers of the public elementary schools in England and Wales was 6,090,357 in 1909, and 6,084,314 in 1910.

The table above and the accompanying diagram show that girls are, on the whole, smaller in stature and less heavy than boys until about the age of eleven, when they overtake the latter both as regards height and as regards weight.

"There is much consensus among investigators that from eleven (Bowditch, Geissler, Uhlitzsch, Comte) or twelve (Key, Hertel), till fourteen (Comte) or even sixteen (Key, Hertel), girls are taller than boys and are then overtaken by them. This is by some thought to be true of all races and classes of society." * Bowditch, the American observer, gives it as his opinion that "at heights below 58 ins. boys are heavier than girls in proportion to their stature, and at heights above this the reverse is the case." † Reference

* G. Stanley Hall, "Adolescence," Vol. I., p. 18.

† *Ibid.*, Vol. I., p. 16.


CHART I
Showing average heights & weights of boys & girls in public elementary schools.
WEIGHTS
HEIGHTS
Heights in inches & Weights in pounds.
BOYS
GIRLS
Age
100
90
80
70
60
50
40
30
20
10
3
4
5
6
7
8
9
10
11
12
13
14

to Tables I and III, however, shows that in England and Wales this does not hold. The $\frac{W}{H}$ index for boys falls below that for girls between the ages of eleven and twelve, when the height of boys is on the average between 53 and 55 ins.

The results shown in Table I. do not exactly correspond with those of the Anthropometric Committee of the British Association, for reasons which will be presently explained. The final tables of the British Association Committee will be found in full in Appendix C, as well as the statistics obtained by other investigators. It may be of interest, however, to compare the results of the present enquiry with those reached by others. In putting the statistics side by side with those of the British Association it will, of course, be readily understood that there is no intention of using them as a means of proving an improvement or otherwise of the physique of the child population.

Though the Anthropometric Committee of the British Association surveyed the whole of the United Kingdom, yet "the children are chiefly those of English parents, as few returns have been received from other parts of the kingdom. All classes of the community are represented, from the upper and professional classes, whose children attend the public schools like Eton, Marlborough and Radley, to the poorest town population, whose children are found in the public elementary (or Board) schools, charitable institutions, and industrial schools." * The classification adopted in the table in Appendix C † is explained as follows: Class I. comprises the upper and professional classes and their children, and it may be accepted as representing the best physique of this country. . . . According to the Census of 1871, this class constitutes 4·46 per cent. of the population. Class II. consists of the commercial classes, such as clerks and shopkeepers, and their children, whose occupations are carried on in towns, and for the most part indoors. . . . Class II. comprises 10·36 per cent. of the population. Class III. represents the labouring classes, such as agricultural labourers, fishermen, miners,

* British Association Report, 1883, p. 281. † Table I (a) and (b).

and others who follow outdoor healthy occupations, but whose nurture is inferior to the two former classes. This class comprises 47·46 per cent. or nearly half the population of the country. Class IV. represents the mass of our town population, engaged as artisans. Their trades being carried on indoors and requiring less physical exercise than Class III., place them under less favourable conditions as to sanitary surroundings. This class forms 26·82 per cent. or about a fourth of the population. Class V., comprising persons living in towns and following sedentary occupations has been omitted from the tables, as sufficient data has not been received to fairly represent it. This class constitutes 10·90 per cent. of the population." *

The average stature and weight of each of the four classes were worked out from the number of observations from each class; "but as the several classes constitute different proportions of the general population the average representing the 'general population,'" was not calculated from the total number of observations, "but is the average of the other four averages, and it is therefore the average of the four classes rather than of all the individuals measured and weighed."† The observations referring to children "were received from schools devoted to the education of special classes of society and in numbers which did not correspond with the respective percentage proportion of the general population. By adopting the average of the averages of the four classes into which the school children have been distributed according to the occupations of their parents, the inequality of the percentage proportion has been eliminated."‡

The foregoing extracts will make it quite clear that no close comparison can be made between the Anthropometric Committee's results and those of the present enquiry. In the first place the present investigation deals only with the public elementary school population of England and Wales, which is representative of Groups II., III., IV., and V.

* British Association Report, 1883, p. 287.
† *Ibid.*, pp. 287, 288.
‡ *Ibid.*, p. 288.

of the Committee's classification. It is of course impossible to separate these various grades. The Committee's final figures do not include Class V., a class which is well represented in the elementary schools of the country, but do include Class I., which contains particulars of children not included to any extent in the figures given by the school medical officers on whose reports this enquiry is based. As an actual national average the results of the Anthropometric Committee are too high, as they exclude Class V., comprising 10·9 per cent. of the population, whilst the results of the present investigation are too low, as they exclude Class I., and very probably some part of Class II.

Table II. gives, in addition to the British Association results, the statistics of Messrs. Tuxford and Glegg, the report on the physical condition of children attending the public schools of the school board for Glasgow (1907), the report of an enquiry into the physique of Glasgow school children (1904), the report of the Charity Organisation Society on Edinburgh school children, the report of the Dundee Social Union, the report of the Royal Commission on Physical Training (Scotland), particulars of which will be found in Appendix C. The United States figures are those of Boas (for heights) and Burk (for weights).

TABLE II

| Age. | Present Enquiry. | British Association. | Tuxford and Glegg. | Glasgow Chalmers, etc. | Glasgow (Mackenzie). | Edinburgh (C.O.S.). | Edinburgh (Mackenzie). | Aberdeen. | Dundee. | United States. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Boys' Heights (inches). | | | | | |
| 3 | 36·5 | 36·82 | 36·35 | — | — | — | — | — | — | — |
| 4 | 38·6 | 38·46 | 38·65 | — | — | — | — | — | — | — |
| 5 | 40·7 | 41·03 | 40·55 | — | 40·0 | 40·43 | — | — | 39·37 | 41·7 |
| 6 | 42·8 | 44·00 | 42·5 | 41·63 | 41·9 | 42·55 | 43·36 | 44·3 | 41·78 | 43·9 |
| 7 | 45·0 | 45·97 | 45·15 | 45·4 | 43·7 | 43·85 | 44·40 | 46·2 | 44·19 | 46·0 |
| 8 | 47·4 | 47·05 | 46·95 | 47·27 | 45·8 | 45·82 | 45·81 | 47·3 | 46·06 | 48·8 |
| 9 | 49·2 | 49·70 | 49·1 | 49·34 | 47·7 | 47·52 | 48·11 | 49·0 | 48·82 | 50·0 |
| 10 | 50·8 | 51·84 | 50·95 | 50·59 | 49·6 | 49·19 | 50·78 | 51·1 | 49·90 | 51·9 |
| 11 | 53·0 | 53·50 | 52·84 | 52·15 | 51·3 | 50·86 | 51·70 | 53·6 | 51·38 | 53·6 |
| 12 | 54·9 | 54·99 | 55·05 | 53·27 | 53·0 | 52·71 | 53·91 | 55·8 | 52·90 | 55·4 |
| 13 | 56·1 | 56·91 | 56·1 | 55·67 | 54·6 | 54·02 | 55·88 | 56·6 | 54·53 | 57·5 |
| 14 | 58·2 | 59·33 | 57·9 | 54·99 | 56·3 | 55·68 | — | 59·9 | — | 60·0 |
| 15 | 60·7 | 62·24 | — | — | 60·1 | — | — | — | — | 62·9 |

## TABLE II—*continued.*

| Age. | Present Enquiry. | British Association. | Tuxford and Glegg. | Glasgow Chalmers, etc. | Glasgow (Mackenzie). | Edinburgh (C.O.S.). | Edinburgh (Mackenzie). | Aberdeen. | Dundee. | United States. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | **BOYS' WEIGHTS (lbs.).** | | | | | |
| 3 | 32·9 | 34·0 | 32·75 | — | — | — | — | — | — | — |
| 4 | 35·8 | 37·3 | 35·9 | — | — | — | — | — | — | — |
| 5 | 38·7 | 39·9 | 38·7 | — | 38·6 | 37·74 | — | — | 37·50 | — |
| 6 | 42·2 | 44·4 | 42·6 | 39·19 | 41·8 | 42·54 | 43·63 | 46·9 | 41·75 | 45·2 |
| 7 | 46·4 | 49·7 | 44·55 | 46·27 | 45·3 | 44·93 | 46·84 | 51·3 | 45·50 | 49·5 |
| 8 | 52·0 | 54·9 | 50·4 | 49·06 | 49·3 | 50·22 | 49·33 | 54·9 | 49·50 | 54·5 |
| 9 | 55·9 | 60·4 | 55·39 | 51·91 | 53·6 | 53·53 | 54·83 | 58·9 | 57·50 | 59·6 |
| 10 | 60·4 | 67·5 | 60·4 | 57·41 | 58·3 | 58·51 | 60·60 | 62·8 | 59·87 | 65·4 |
| 11 | 66·4 | 72·6 | 65·98 | 60·74 | 63·1 | 62·26 | 63·18 | 70·2 | 62·75 | 70·7 |
| 12 | 72·7 | 76·7 | 72·85 | 65·33 | 68·1 | 67·71 | 69·52 | 77·3 | 68·62 | 76·9 |
| 13 | 77·4 | 82·6 | 77·5 | 74·41 | 73·5 | 71·61 | 75·61 | 80·6 | 74·25 | 84·8 |
| 14 | 84·0 | 92·0 | 84·1 | 72·21 | 79·3 | 78·70 | — | 95·7 | — | 95·2 |
| 15 | 94·1 | 102·7 | — | — | 92·5 | — | — | — | — | 107.4 |
| | | | | | **GIRLS' HEIGHTS (inches).** | | | | | |
| 3 | 36·0 | 36·23 | 36·05 | — | — | — | — | — | — | — |
| 4 | 38·4 | 38·26 | 38·65 | — | — | — | — | — | — | — |
| 5 | 40·4 | 40·55 | 40·4 | — | 39·9 | 39·57 | — | — | 39·58 | 41·3 |
| 6 | 42·5 | 42·88 | 42·36 | 41·97 | 41·6 | 41·33 | 42·82 | 43·7 | 41·34 | 43·3 |
| 7 | 44·8 | 44·45 | 44·85 | 44·78 | 43·4 | 43·45 | 44·33 | 45·8 | 44·19 | 45·7 |
| 8 | 46·9 | 46·60 | 46·29 | 46·64 | 45·2 | 45·11 | 46·40 | 46·5 | 45·47 | 47·7 |
| 9 | 48·7 | 48·73 | 48·7 | 48·56 | 47·2 | 47·19 | 47·58 | 49·4 | 48·23 | 49·7 |
| 10 | 50·6 | 51·05 | 51·1 | 49·52 | 49·0 | 48·88 | 49·68 | 50·5 | 49·41 | 51·7 |
| 11 | 53·0 | 53·10 | 52·55 | 51·80 | 50·8 | 50·89 | 52·53 | 52·9 | 52·56 | 53·8 |
| 12 | 55·5 | 55·66 | 54·68 | 54·11 | 52·9 | 52·03 | 53·58 | 54·9 | 53·25 | 56·1 |
| 13 | 56·8 | 57·77 | 56·9 | 55·86 | 55·1 | 54·69 | 56·29 | 57·0 | 55·32 | 58·5 |
| 14 | 58·9 | 59·80 | 58·66 | 54·95 | 57·1 | 55·58 | — | 60·4 | — | 60·4 |
| 15 | 60·3 | 60·93 | — | — | 60·0 | — | — | — | — | 61·6 |
| | | | | | **GIRLS' WEIGHTS (lbs.).** | | | | | |
| 3 | 31·7 | 31·6 | 31·85 | — | — | — | — | — | — | — |
| 4 | 35·0 | 36·1 | 34·88 | — | — | — | — | — | — | — |
| 5 | 37·7 | 39·2 | 37·6 | — | 37·8 | 36·40 | — | — | 37·00 | — |
| 6 | 41·2 | 41·7 | 40·98 | 37·84 | 40·6 | 39·87 | 42·38 | 45·4 | 41·00 | 43·4 |
| 7 | 44·9 | 47·5 | 45·2 | 43·72 | 43·9 | 43·77 | 45·24 | 48·4 | 45·62 | 47·7 |
| 8 | 49·6 | 52·1 | 48·94 | 45·66 | 47·5 | 46·73 | 49·25 | 50·0 | 47·25 | 52·5 |
| 9 | 54·1 | 55·5 | 54·59 | 51·86 | 51·9 | 51·45 | 51·94 | 55·7 | 55·5 | 57·4 |
| 10 | 58·7 | 62·0 | 58·9 | 54·87 | 56·1 | 56·51 | 58·06 | 61·4 | 58·25 | 62·9 |
| 11 | 65·5 | 68·1 | 65·24 | 62·28 | 61·1 | 60·47 | 63·27 | 65·5 | 64·5 | 69·5 |
| 12 | 73·9 | 76·4 | 73·89 | 65·55 | 67·2 | 66·52 | 70·03 | 72·7 | 67·5 | 78·7 |
| 13 | 80·4 | 87·2 | 80·0 | 75·78 | 75·1 | 74·77 | 78·56 | 82·8 | 75·00 | 88·7 |
| 14 | 88·1 | 96·7 | 87·75 | 72·46 | 82·9 | 72·00 | — | 94·5 | — | 98·3 |
| 15 | 96·2 | 106·3 | — | — | 98·9 | — | — | — | — | 106.7 |

## TABLE III.

SHOWING $\frac{W}{H}$ (POUNDS WEIGHT PER INCH OF HEIGHT) FOR BOYS AND GIRLS, AT EACH YEAR OF AGE FROM 3 TO 15.

| Age. | Boys. | Girls. |
|---|---|---|
| 3 | ·902 | ·881 |
| 4 | ·926 | ·911 |
| 5 | ·951 | ·933 |
| 6 | ·986 | ·969 |
| 7 | 1·030 | 1·004 |
| 8 | 1·097 | 1·056 |
| 9 | 1·137 | 1·110 |
| 10 | 1·187 | 1·160 |
| 11 | 1·256 | 1·236 |
| 12 | 1·324 | 1·331 |
| 13 | 1·380 | 1·415 |
| 14 | 1·444 | 1·495 |
| 15 | 1·554 | 1·597 |

From the statistics of stature and weight set forth in Table I. the $\frac{W}{H}$ index (pounds weight per inch of height) was calculated for both sexes at each year of age from three to fifteen. The results show (see Table III.) that at the lower ages, boys are heavier relatively to height than girls; but between the ages of eleven and twelve the girls are heavier relatively to height than the boys. Chart VII. relating to Newcastle children gives an illustration of its use. The modification of this simple form of index, already referred to in Chapter II. $\frac{100 \sqrt[3]{\text{Weight (kilogs.)}}}{\text{Height (cms.)}}$ which is regarded as being free from the defects of the $\frac{W}{H}$ index has been calculated, and is given in Table IV. An illustration of its use will be found in Chart VI., which shows more clearly

than Chart VII. $\left(\frac{W}{H}\right)$ the physical inferiority of the poorer children. If, as has been suggested, this index is independent of racial differences, its divergence from the average may be taken as expressing in a rough way the standard of nutrition.

TABLE IV.

SHOWING THE VALUE OF $\frac{100 \sqrt[3]{\text{Weight (Kilogs)}}}{\text{Height (Cms.)}}$ FOR BOYS AND GIRLS AT EACH YEAR OF AGE FROM 3 TO 15.

| Age. | Boys. | Girls. |
|---|---|---|
| 3 | 2·66 | 2·66 |
| 4 | 2·58 | 2·58 |
| 5 | 2·51 | 2·51 |
| 6 | 2·46 | 2·45 |
| 7 | 2·41 | 2·40 |
| 8 | 2·38 | 2·37 |
| 9 | 2·35 | 2·35 |
| 10 | 2·33 | 2·32 |
| 11 | 2·31 | 2·30 |
| 12 | 2·30 | 2·29 |
| 13 | 2·30 | 2·30 |
| 14 | 2·28 | 2·28 |
| 15 | 2·27 | 2·30 |

It will be seen that the number is practically the same for boys as for girls.

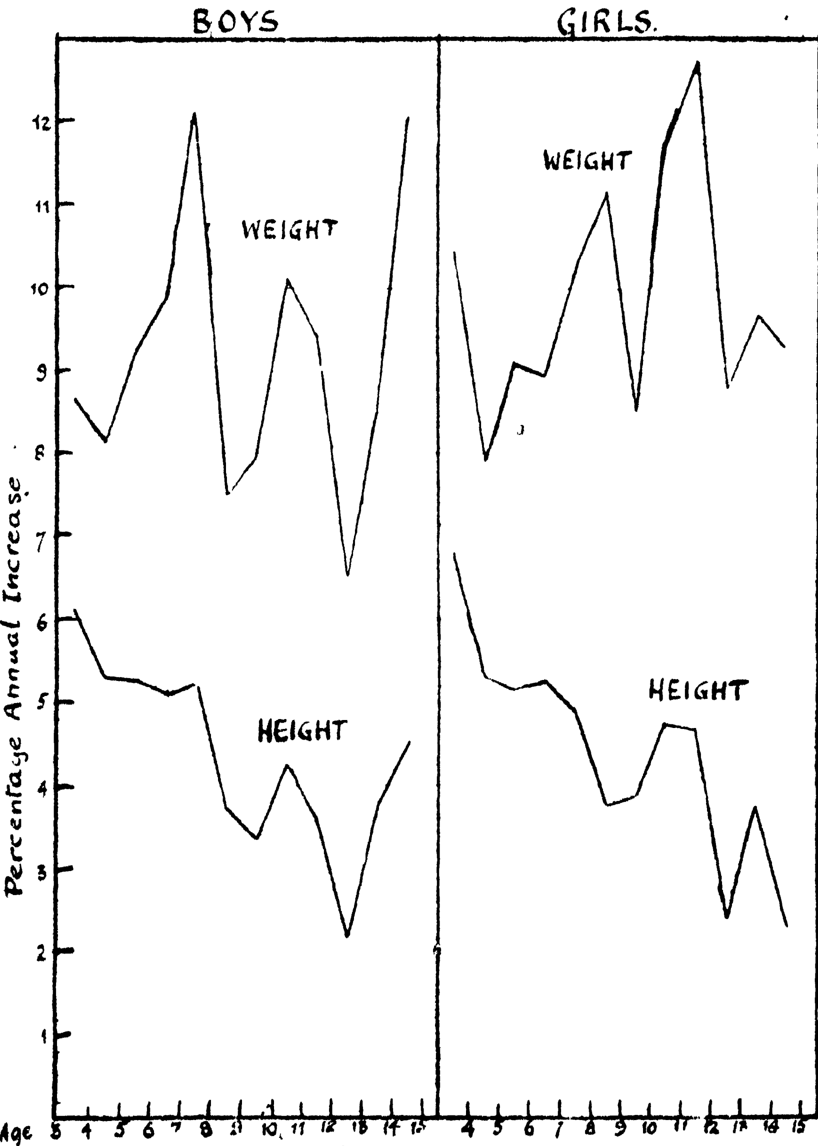
In conclusion, a reference may be made to the annual rate of growth in height and weight, which fluctuates considerably during school life. Table V. shews the annual percentage increase in both stature and weight.

## TABLE V.

### Annual Percentage Increase in Height and Weight of Boys and Girls.

| Age. | Boys. | | Girls. | |
|---|---|---|---|---|
| | Height. | Weight. | Height. | Weight. |
| 3–4 | 6·12 | 8·63 | 6·79 | 10·42 |
| 4–5 | 5·31 | 8·14 | 5·34 | 7·89 |
| 5–6 | 5·28 | 9·20 | 5·17 | 9·27 |
| 6–7 | 5·16 | 9·85 | 5·24 | 8·95 |
| 7–8 | 5·22 | 12·07 | 4·87 | 10·28 |
| 8–9 | 3·78 | 7·50 | 3·77 | 11·18 |
| 9–10 | 3·37 | 7·96 | 3·88 | 8·51 |
| 10–11 | 4·21 | 10·04 | 4·76 | 11·64 |
| 11–12 | 3·59 | 9·41 | 4·66 | 12·73 |
| 12–13 | 2·17 | 6·52 | 2·39 | 8·81 |
| 13–14 | 3·73 | 8·53 | 3·73 | 9·63 |
| 14–15 | 4·43 | 12·07 | 2·25 | 9·23 |

The results expressed numerically in the table may be better appreciated when expressed graphically, as in Chart II. It will be observed that there is a fairly steady rate of growth in height of both boys and girls up to the age of seven years, whilst the rate of growth in weight is increasing; then follows a sharp fall in the rate of growth in both stature and weight, followed by a rise in the rate to the age of ten. From the age of ten to twelve the rate declines rapidly, after which there is an increased percentage growth. The percentage growth from year to year is apparently pretty much the same for different races, so that it may be a useful development index number. An illustration of its use will be found on pages 39 and 40.


CHART II Showing percentage annual growth of Elementary School children
BOYS
GIRLS.
WEIGHT
HEIGHT
WEIGHT
HEIGHT
Percentage Annual Increase
Age
12
11
10
9
8
7
6
5
4
3
2
1

## CHAPTER IV.

### Some Further Results.

In accordance with the method explained in Chapter II., the index of physique (being the average of the four index numbers for boys' and girls' heights and boys' and girls' weights) was calculated for those administrative areas from which reports were received. These index numbers are set forth in Appendix A. An examination of them brings to light many interesting problems for the full elucidation of which further enquiry would be necessary.

Attention may first be drawn to the difference in development between boys and girls in some districts, as measured by the index numbers. In some areas the boys are apparently relatively taller and heavier than the girls, though in others the reverse seems to be the case.

TABLE VI. (*a*)

Index Numbers.

| Area. | Boys' | | Girls' | |
|---|---|---|---|---|
| | Height. | Weight. | Height. | Weight. |
| Carlisle .. .. | 98·3 | 97·3 | 97·6 | 95·0 |
| Merthyr Tydfil .. | 96·5 | 98·5 | 91·5 | 95·5 |
| Margate .. .. | 98·0 | 96·6 | 97·0 | 94·2 |
| Bolton .. .. | 98·8 | 100·4 | 97·9 | 96·6 |
| Manchester .. .. | 98·7 | 99·3 | 97·4 | 98·6 |
| Walthamstow .. | 99·6 | 101·7 | 98·5 | 99·2 |
| Stoke-on-Trent .. | 101·0 | 100·0 | 98·2 | 94·5 |
| W. Riding (Yorks) C.C. | 100·1 | 100·4 | 99·2 | 98·6 |
| Huddersfield . .. | 98·1 | 96·8 | 97·2 | 95·2 |

In Table VI. (*a*) the boys show some degree of superiority

over the girls, whilst Table VI. (*b*), below, gives some areas where the girls appear to advantage over the boys.

TABLE VI. (*b*).

INDEX NUMBERS.

| Area. | Boys' | | Girls' | |
|---|---|---|---|---|
| | Height. | Weight. | Height. | Weight. |
| Berkshire C.C. .. | 100·9 | 100·7 | 101·6 | 102·8 |
| Portsmouth .. .. | 99·2 | 99·2 | 101·1 | 101·3 |
| Blackburn .. .. | 98·0 | 98·8 | 98·9 | 100·6 |
| Bootle .. .. | 98·8 | 99·0 | 99·4 | 101·2 |
| Edmonton .. .. | 98·1 | 96·7 | 98·7 | 97·5 |
| Wiltshire C.C. .. | 100·6 | 101·9 | 101·3 | 103·5 |
| Worcester C.C. .. | 99·2 | 101·3 | 100·8 | 103·9 |

Further, an examination of Appendix A reveals the fact that in a considerable number of districts (principally County Council areas, and therefore more or less rural in character) the index for weight is higher than that for height, and in most cases the index numbers for both height and weight are above 100. In other areas (chiefly towns of some size) the height index number is greater than that for weight, and, generally speaking, both sets of indexes fall below 100.

Some of the country areas in their statistics give particulars of height and weight for both "urban" and rural children. In Table VII. will be found the index numbers of those administrative districts, for which figures are given in Appendix A.

TABLE VII.

INDEX NUMBERS OF "URBAN" AND "RURAL" CHILDREN IN COUNTY COUNCIL AREAS.

| Area. | Boys. | | | | Girls. | | | | Average. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Heights. | | Weights. | | Heights. | | Weights. | | | |
| | R. | U. | R. | U. | R. | U. | R. | U. | R. | U. |
| Flint C.C. .. | 101·0 | 100·3 | 99·6 | 99·3 | 100·8 | 100·7 | 100·3 | 100·9 | 100·4 | 100·3 |
| Merioneth C.C. | 101·5 | 100·3 | 105·7 | 99·6 | 101·0 | 99·5 | 103·1 | 99·4 | 102·8 | 99·7 |
| Northants C.C. | 101·6 | 101·2 | 104·5 | 102·2 | 101·4 | 101·4 | 101·4 | 99·3 | 102·2 | 101·0 |
| Notts C.C. .. | 101·5 | 98·8 | 105·1 | 100·1 | 101·4 | 99·3 | 104·3 | 99·3 | 103·1 | 99·4 |
| Somerset C.C. | 101·0 | 100·5 | 100·8 | 99·7 | 101·4 | 100·6 | 101·8 | 100·4 | 101·3 | 100·3 |
| Staffs C.C. .. | 102·8 | 101·1 | 105·5 | 102·2 | 103·1 | 101·7 | 106·2 | 103·4 | 104·4 | 102·1 |
| E. Sussex C.C. | 101·0 | 100·4 | 102·7 | 100·2 | 102·6 | 100·6 | 104·2 | 101·7 | 102·6 | 100·7 |
| Wilts C.C. .. | 100·7 | 99·1 | 102·5 | 100·8 | 101·4 | 101·1 | 103·5 | 102·2 | 102·0 | 100·8 |
| Totals .. | 811·1 | 801·7 | 826·4 | 804·1 | 813·1 | 804·9 | 824·8 | 806·6 | 818·8 | 804·3 |
| Averages .. | 101·4 | 100·2 | 103·3 | 100·5 | 101·6 | 100·6 | 103·1 | 100·8 | 102·4 | 100·5 |

The summary of the table above may be conveniently set forth as follows :—

TABLE VIII.

| — | Index Numbers. | |
|---|---|---|
| | Rural. | Urban. |
| Boys' Heights .. | 101·4 | 100·2 |
| ,, Weights .. | 103·3 | 100·5 |
| Girls' Heights .. | 101·6 | 100·6 |
| ,, Weights .. | 103·1 | 100·8 |
| Final Index .. | 102·4 | 100·5 |

Before entering on an examination of these index numbers something must be said of the nature of the material. The children coming under the heading "urban" are not town

children in the sense in which the term is popularly understood. They are really semi-urban, living in the comparatively small centres of population in the county areas. In the classification of the children there is certain to be some amount of overlapping, *e.g.* rural children will in many cases be attending urban schools, which will tend to minimise any difference there may be in the index numbers for rural and "urban" scholars. This, therefore, must be borne in mind in any comparison of the two sets of figures.

Now, when the results are examined there is found to be an appreciable difference in height and weight between the rural and "urban" children of County Council areas. In the first place it will be observed that the "urban" children are slightly above the average for the whole country, the excess being rather more in the case of girls than boys. But whereas these "urban" boys and girls are on the whole ·5 per cent. above the average as regards stature and weight, the rural children are nearly 2½ per cent. above. It will be noticed that relatively to height the rural children are heavier than those from "urban" schools, and that the deviation from the average is practically the same for both boys and girls (1·4 and 1·6 respectively for height, and 3·3 and 3·1 respectively for weight).

A comparison may be made of the children of the industrial centres and those of the County Council areas, which will bring out clearly the physical inferiority of the boys and girls in the more densely populated districts. The reasons for the difference are probably both racial and environmental, and until special enquiry is made, so as to eliminate racial and other factors, the inferior physique of children of the manufacturing districts cannot be attributed to the conditions of town life.

The County Council areas are those included in Appendix A, and the industrial areas, 44 in number, comprise the manufacturing towns of Lancashire, the larger towns of the West Riding of Yorkshire, the Potteries, South Wales, the North-East Coast, etc., found in the same table. The index numbers are summarised below.

TABLE IX.

| | Boys. | | Girls. | | Average |
|---|---|---|---|---|---|
| | Height. | Weight. | Height. | Weight. | |
| County Council Areas .. | 100·4 | 101·5 | 100·8 | 102·1 | 101·2 |
| Manufacturing Towns .. | 98·7 | 97·9 | 98·2 | 97·0 | 97·9 |

Both as regards height and weight the scholars in the County Council areas are above the average, the girls, on the whole, being rather superior to the boys; and in the case of both sexes the weights stand better than the heights. The town children, on the other hand, are inferior to the average on both counts; but whereas the country children are relatively more superior as regards weight, those of the towns are relatively more superior—or less inferior—as regards height. It will also be observed that amongst the scholars in the County Council districts the girls show to greater advantage than the boys; but amongst the children of the industrial towns the girls fall slightly further below the average than the boys. Taking boys and girls together, the country children are 1·2 per cent. above the average and those of the towns 2·1 per cent. below.

The following small table summarises the figures set forth in Tables VIII. and IX.:—

TABLE X.

| Children. | Index No. |
|---|---|
| (1) County Council (specified as "Rural") .. | 102·4 |
| (2) ,, ,, ( ,, "Urban") .. | 100·5 |
| (3) Total County Council areas .. .. .. | 101·2 |
| (4) Manufacturing towns .. .. .. .. | 97·9 |

The comparison of country with town children should

really be based on the index for the children specified in the County Council reports as "rural" (No. 1 above) and the index for the industrial districts (No. 4). The difference, it will be observed, is considerable.

Ignoring racial differences, the children of the towns may therefore be said to reach the average when their index number is about 98, and the extent of their deviation from the "normal" should be reckoned from 98 rather than from 100. Similarly, the index of country children of average development should, on the whole, reach 101·0.

The industrial towns have been analysed into groups as follows :—

(1) Durham and the North-East Coast.
(2) The counties of Glamorgan and Monmouth.
(3) Lancashire cotton towns.
(4) Yorkshire woollen towns.
(5) Staffordshire pottery and hardware towns.

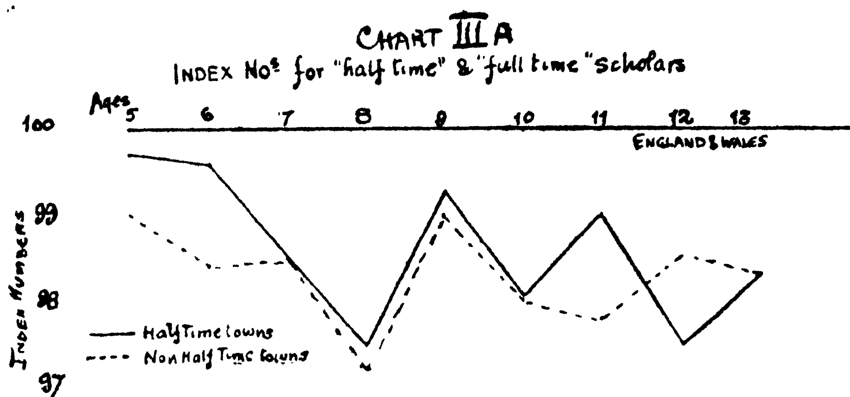
The table below shows the index numbers of each group.

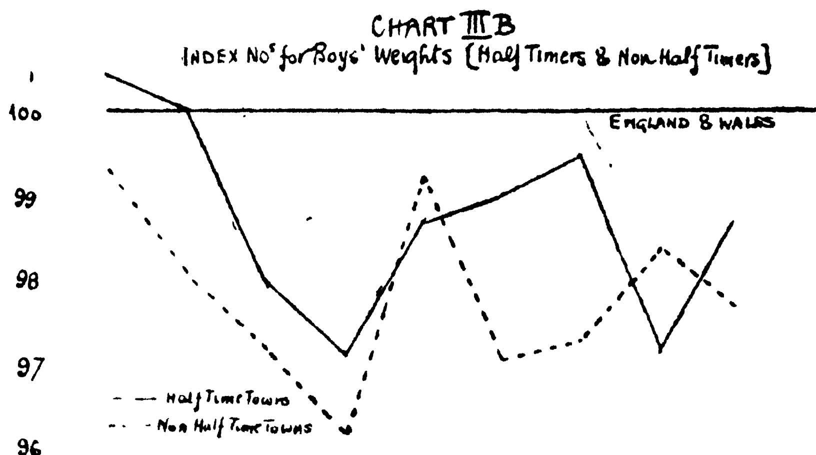
TABLE XI.

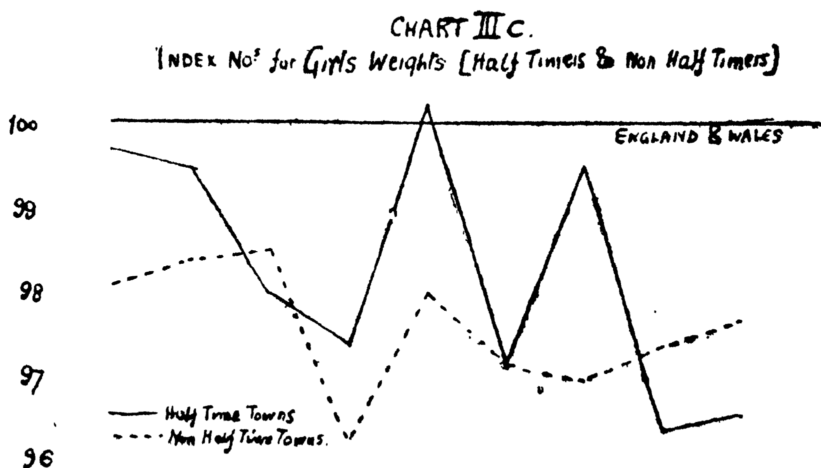
INDEX NUMBERS.

| Numbers | Boys | | Girls | | Average. |
|---|---|---|---|---|---|
| | Height. | Weight. | Height. | Weight. | |
| Durham, etc. .. .. | 97·6 | 95·7 | 97·6 | 95·7 | 96·6 |
| Glam. and Mon. .. | 98·5 | 98·7 | 98·2 | 98·4 | 98·5 |
| Woollen towns .. .. | 98·8 | 98·4 | 98·2 | 96·9 | 98·1 |
| Cotton towns .. .. | 98·6 | 98·1 | 98·2 | 97·2 | 98·0 |
| Staffs. towns .. .. | 99·2 | 97·8 | 98·7 | 96·4 | 98·0 |
| All Manufacturing towns | 98·7 | 97·9 | 98·2 | 97·0 | 97·9 |

The towns of Yorkshire, Lancashire, and Staffordshire yield very similar index numbers, that of the South Wales coal-field being slightly higher, owing to a small degree of superiority in weight as compared with the former groups of towns. The Durham and district towns, however, show an appreciably smaller index number, the children in this district being, apparently, smaller and lighter than those of other industrial areas.


CHART III A
INDEX No^s for "half time" & "full time" scholars
Ages 5 6 7 8 9 10 11 12 13
100
99
98
97
INDEX NUMBERS
ENGLAND & WALES
Half Time towns
Non Half Time towns


CHART III B
INDEX No^s for Boys' Weights [Half Timers & Non Half Timers]
100
99
98
97
96
ENGLAND & WALES
Half Time Towns
Non Half Time Towns


CHART III C.
INDEX No^s for Girls Weights [Half Timers & Non Half Timers]
100
99
98
97
96
ENGLAND & WALES
Half Time Towns
Non Half Time Towns.

In the next place, attention may be directed to an examination of the index numbers of industrial districts, classified according to the prevalence of "half-time" labour. The table below shows the index numbers (for heights and weights of both boys and girls) at each year of age for (1) the "half-time" towns of Lancashire, and (2) the industrial towns of England and Wales where partial exemption is practically unknown.

TABLE XII.

| | Age 5. | Age 6. | Age 7. | Age 8. | Age 9. | Age 10. | Age 11. | Age 12. | Age 13. |
|---|---|---|---|---|---|---|---|---|---|
| 1. "Half-time" Towns | 99·7 | 99·6 | 98·5 | 97·5 | 99·3 | 98·1 | 99·0 | 97·5 | 98·3 |
| 2. "Non-half-time" industrial towns .. | 99·0 | 98·4 | 98·5 | 97·2 | 99·0 | 98·0 | 97·8 | 98·5 | 98·3 |

It is interesting to observe that at every year of age the "half-time" towns are superior or equal to those other towns where there is no "half-time." This will be seen more clearly by reference to Chart III. It will be noticed that, whilst the deviation from the average varies, there is a rough correspondence between the two curves except at higher ages, where there is a significant difference. In the "non-half-time" towns there is, from the age of eleven to twelve, an approach to the normal, but in the case of the "half-time" towns the movement of the curve shows a relative decline in physique at the age of twelve years. Charts III. (*b*) and III. (*c*) show the index numbers for boys' weights and girls' weights respectively in "half-time" and "non-half-time" towns. The general superiority of the former is again observable, as well as the dip in the index number at age twelve. Whilst in the case of "non-half-time" girls the index number rises regularly from the age of eleven, the index number for girls in the "half-time" towns sinks to its lowest point at the age of partial exemption.

Table XIII. shows the combined index numbers for heights and weights of Bradford school children, a large

proportion of whom enter the textile mills as "half-time" workers at the age of twelve. Unfortunately, there are not complete statistics for the neighbouring towns, where "half-time" is either absent or insignificant. The index numbers at twelve years of age, it will be observed, are higher than that for Bradford.

TABLE XIII.

INDEX NUMBERS.

| Ages. | Bradford. | Leeds. | Sheffield. | Wakefield. | Huddersfield. |
|---|---|---|---|---|---|
| 5 | 99·2 | 98·2 | 97·8 | 99·4 | 98·0 |
| 6 | 97·7 | 98·6 | 97·9 | 95·9 | — |
| 7 | 96·9 | 96·9 | 96·7 | 97·9 | 96·8 |
| 8 | 97·8 | — | — | — | — |
| 9 | 98·6 | — | — | — | — |
| 10 | 98·1 | — | — | — | 96·8 |
| 11 | 99·2 | — | — | — | — |
| 12 | 95·7 | 97·4 | 97·8 | 96·8 | — |
| 13 | 98·7 | 96·9 | 98·0 | 97·3 | 95·8 |

The index numbers in the above table are shown graphically in Chart IV (*a*). The marked deviation from the average at age twelve is noticeable in the case of both height and weight of the Bradford scholars, as will be seen from Table XIV. below.

TABLE XIV.

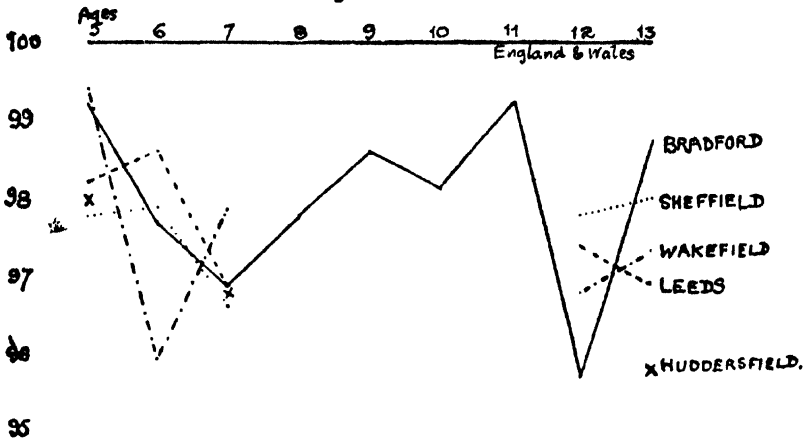
BRADFORD INDEX NUMBERS.

| Ages. | Boys. | | Girls. | |
|---|---|---|---|---|
| | Heights. | Weights. | Heights. | Weights. |
| 5 | 99·5 | 99·7 | 99·5 | 97·9 |
| 6 | 97·9 | 98·3 | 98·4 | 96·1 |
| 7 | 98·4 | 96·6 | 98·0 | 94·7 |
| 8 | 98·3 | 95·4 | 98·9 | 98·6 |
| 9 | 98·8 | 97·3 | 97·9 | 100·2 |
| 10 | 98·4 | 97·2 | 98·6 | 98·3 |
| 11 | 98·5 | 99·4 | 99·5 | 99·5 |
| 12 | 97·5 | 94·8 | 96·6 | 93·7 |
| 13 | 99·6 | 99·5 | 98·6 | 97·0 |

In the case of the girls there is a serious decline in the standard of both height and weight at the "half time"

## CHART IV A.

INDEX NUMBERS for Bradford & other West Riding Towns [see Table XIII]




## CHART IV B. BRADFORD (see Table XIV)

age. (*See* Chart IV. (*b*). The tables given above seem to bear out the contention that the physique of "half timers" suffers in consequence of their employment in industry.* The deterioration at twelve years of age will in the tables and charts given above be obscured to some extent by the existence of large numbers of children pursuing the normal school life at that age.

It should be noted, however, that in Oldham it was found that among both the boys and girls those who work half time appear to be taller and heavier than those who attend school full time.

HALF-TIME AND FULL-TIME SCHOLARS (OLDHAM).†

| —— | Half-time. | Full Time. |
|---|---|---|
| Boys' heights (ins.) .. .. | 53·0 | 52·5 |
| ,, weights (lbs.) .. .. | 69·2 | 67·8 |
| Girls' heights (ins.) .. .. | 53·5 | 52·5 |
| ,, weights (lbs.) .. .. | 68·0 | 65·5 |

The reasons given for this inferiority of full-time scholars are: "(1) That those working half-time are on the average older than those not working; (2) that the tendency would be for the stronger and better developed children to go to work, while the weaker and delicate children would be kept at school; (3) that the worker, as he is bringing in a wage, is better fed than those who are not wage earners."‡ If these reasons can be applied generally, then where the half-timers are smaller and lighter than the full-timers the real difference is greater than appears from the statistics.

In a number of towns the school medical officers have classified the children in the elementary schools, or, rather, schools as a whole, according to social grade; but whereas some adopt two groups only, others have adopted three

* *See* Appendix C., Table XIII.
† Oldham School Medical Officer's Annual Report, 1910, Table A., facing p. 96.
‡ *Ibid.*, p. 79.

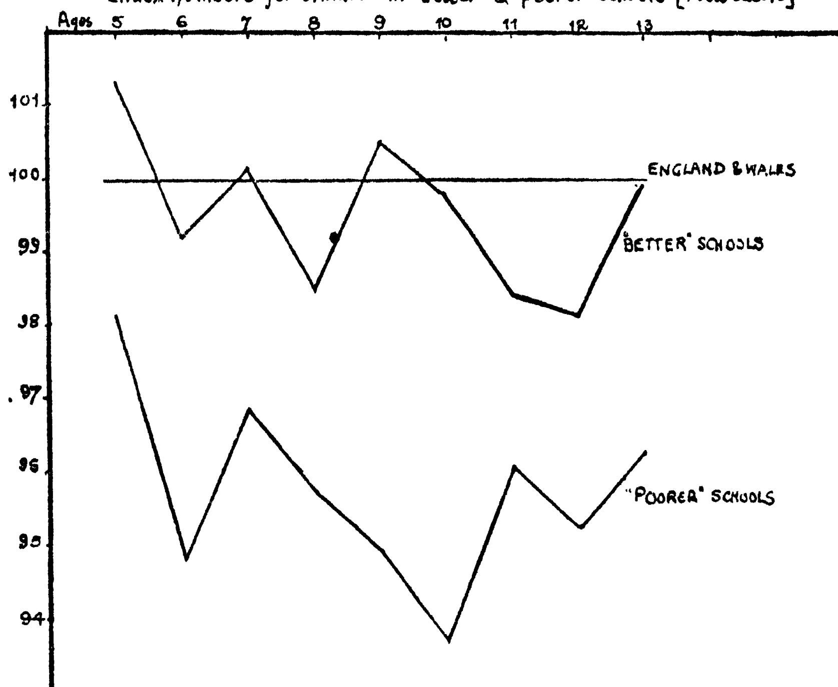
(*e.g.* Nottingham), and even four classes (*e.g.* Leeds). Then the standard as to what constitutes "poor" children is likely to vary from place to place in the absence of any widely accepted basis of comparison. It will be evident, therefore, that it is not possible to measure the difference in physique between poor and more prosperous children as a whole, though, as the following table proves, the latter show to advantage over the former: *

TABLE XV.

INDEX NUMBERS.

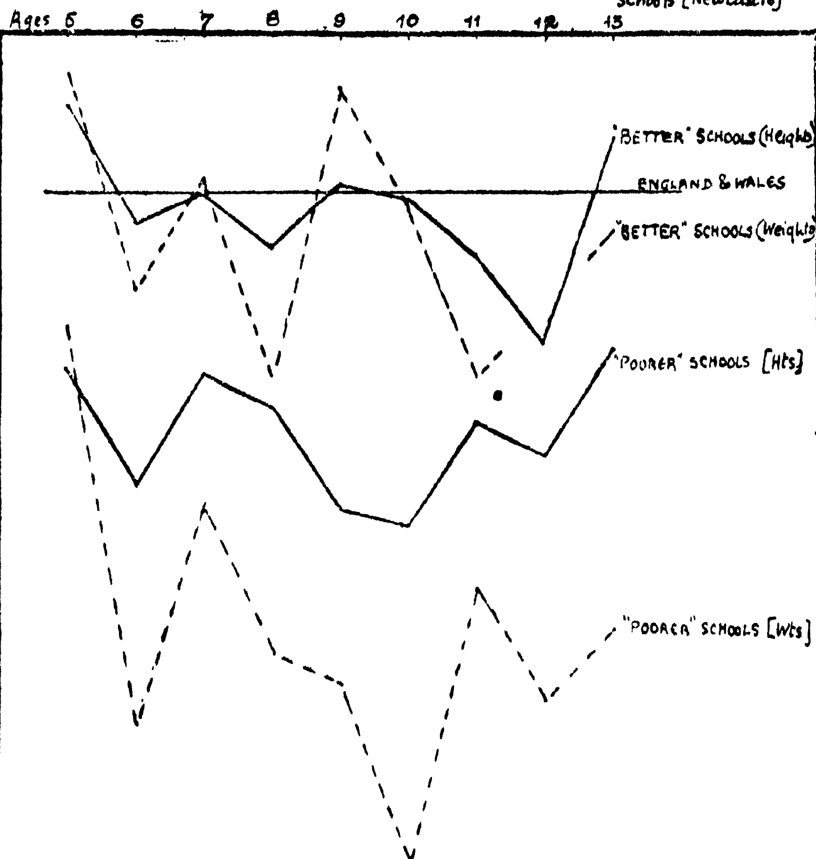
| Place. | Class of School | Boys. Heights | Boys. Weights | Girls. Heights | Girls. Weights | Average |
|---|---|---|---|---|---|---|
| Bradford .. | Ordinary | 99·9 | 99·2 | 99·4 | 100·2 | 99·7 |
| | Poor .. | 96·9 | 96·5 | 96·9 | 94·9 | 96·3 |
| Brighton .. | Better .. | 101·5 | 98·8 | 102·7 | 102·5 | 101·4 |
| | Poorer .. | 98·3 | 93·4 | 98·5 | 96·6 | 96·7 |
| Leeds (1909) | Suburban | 100·4 | 101·1 | 100·4 | 101·4 | 100·8 |
| | Better .. | 101·1 | 100·6 | 100·4 | 99·6 | 100·4 |
| | Ordinary | 98·2 | 96·4 | 97·7 | 96·5 | 97·2 |
| | Poor .. | 96·4 | 95·8 | 97·0 | 95·6 | 96·2 |
| | Jewish .. | 99·4 | 102·6 | 98·9 | 103·7 | 101·2 |
| Leeds (1910) | Suburban | 99·6 | 99·3 | 99·3 | 98·3 | 99·1 |
| | Better .. | 100·2 | 99·5 | 100·4 | 99·3 | 99·9 |
| | Ordinary | 97·5 | 95·3 | 97·7 | 95·3 | 96·5 |
| | Poor .. | 96·3 | 94·2 | 96·2 | 93·1 | 95·0 |
| | Jewish .. | 96·3 | 97·0 | 97·1 | 97·6 | 97·0 |
| Leicester .. | Special .. | 101·4 | 102·6 | 101·4 | 101·9 | 101·8 |
| | Medium .. | 99·9 | 102·2 | 101·0 | 101·2 | 101·1 |
| | Very Poor | 98·5 | 97·7 | 99·4 | 98·8 | 98·6 |
| Newcastle (1909) | Better .. | 100·2 | 99·5 | 100·0 | 100·4 | 100·0 |
| | Poorer .. | 96·1 | 92·5 | 95·0 | 92·2 | 94·0 |
| Newcastle (1910) | Better .. | 99·8 | 97·9 | 99·6 | 99·1 | 99·1 |
| | Poorer .. | 96·6 | 93·3 | 97·4 | 94·9 | 95·6 |
| Nottingham | Better .. | 101·7 | 101·7 | 101·4 | 102·8 | 101·9 |
| | Medium .. | 100·2 | 100·8 | 100·2 | 99·8 | 100·3 |
| | Poor .. | 97·3 | 96·9 | 98·2 | 97·9 | 97·6 |

* *See also* Table XXXI., p. 60, and Appendix D. on "The physique of poor children."


CHART V A
Index numbers for children in "better" & "poorer" schools [Newcastle]
Ages 5 6 7 8 9 10 11 12 13
101
100
99
98
97
96
95
94
ENGLAND & WALES
"BETTER" SCHOOLS
"POORER" SCHOOLS

## CHART V B.

Heights & Weights Index Numbers (both sexes combined) for children in "better" & "poorer" Schools [Newcastle]




NOTE:– The break in the "better" schools (weights) curve is due to the rejection of the statistics at age 12.

The final index numbers in column (5) of the above table may be summarised as follows:

TABLE XVI.

INDEX NUMBERS.

| Place. | "Better." | "Ordinary" or "Medium." | "Poor," "Poorer" or "Very poor." |
|---|---|---|---|
| Bradford .. .. | — | 99·7 | 96·3 |
| Brighton .. .. | 101·4 | — | 96·7 |
| Leeds (1909) .. | 100·4 | 97·2 | 96·2 |
| ,, (1910) .. | 99·9 | 96·5 | 95·0 |
| Leicester .. .. | — | 101·1 | 98·6 |
| Newcastle (1909) . | 100·0 | — | 94·0 |
| ,, (1910) . | 99·1 | — | 95·6 |
| Nottingham .. | 101·9 | 100·3 | 97·6 |

Taking Newcastle as an example, we may show by a series of charts the superiority of the better-to-do children over the children from the poorer schools.

In Chart V. (*a*) the combined index numbers of height and weight for both sexes are plotted for the two classes of schools, whilst Chart V. (*b*) gives the index numbers for (*a*) heights, (*b*) weights (boys and girls combined). It will be observed that the children of the poorer schools exhibit considerable inferiority as regards weight, compared with their index number for height (which itself is lower than that for the better schools). As an example of other methods of comparison, two further charts are given. Chart VI. gives the value of $\frac{100 \sqrt[3]{\text{Weight (kgms.)}}}{\text{Height (cms.)}}$, an index to which reference has already been made,* whilst the following chart traces the simpler $\frac{W}{H}$ index, *i.e.* pounds weight per

* *See* Annual Report for 1911 of the Chief Medical Officer of the Board of Education (Cd. 6530), 1912, p. 28, for this index number for East Sussex children at different ages, which shows the superiority of the rural children.

inch of height. In both cases the curves relate to boys. The difference in physical development of the two grades of scholars is obvious.

The rate of growth during school life presents many interesting problems. The average annual percentage increase has already been given, and, generally speaking, the case of children who during any year fail to increase in height and weight (particularly the latter) at the normal rate is such as to warrant medical attention. If the rate of growth be independent of race, then failure to attain the normal rate may be ascribed to the influences of environment.* We should, therefore, expect to see a retarded rate of increase in the case of children bred up in poverty, and the statistics for Newcastle apparently bear out this conclusion. Table XVII. shows the percentage growth of boys and girls in both stature and weight from the age of five to the age of thirteen, below which is given percentage increase between the same ages for the scholars in the better and poorer schools of Nottingham.

TABLE XVII.

SHOWING PERCENTAGE INCREASE FROM 5 TO 13 YEARS OF AGE.

| — | Boys. | | Girls. | |
|---|---|---|---|---|
| | Heights. Per cent. | Weights. Per cent. | Heights. Per cent. | Weights. Per cent. |
| England and Wales | 37·8 | 100·0 | 40·5 | 113·0 |
| Newcastle (better). | 38·0 | 105·2 | 40·4 | 114·7 |
| „ (poorer). | 34·2 | 96·0 | 43·5 | 106·9 |

* The Royal Commission on Physical Training (Scotland) in their Report (Cd. 1507, 1903) when commenting on the relatively poor physique of children in poor schools, state that "race fails to have any apparent bearing on the matter, judging by the cephalic index, one of the most abiding signs of race. Edinburgh, with an index almost uniformly just over 78, should show, were race the chief cause, a less striking contrast between its schools than Aberdeen, where there is more uniformity of conditions among the children of the different schools, though the co-existence of unfused races is greater, as shown by the cephalic index varying between 81·4 and 78·5."

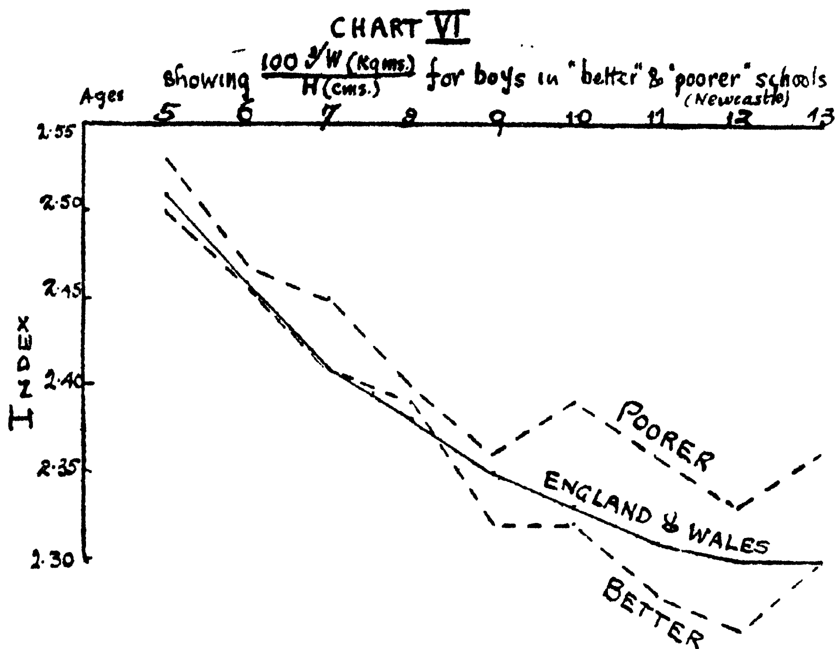



CHART VII
showing W/H index for boys in "better" & "poorer" schools (Newcastle)

Ages 5 6 7 8 9 10 11 12 13

1·40
1·35
1·30
1·25
1·20
1·15
1·10
1·05
1·00
0·95

ENGLAND & WALES
"BETTER"
"POORER"

When this method of comparison was applied to Nottingham, however, the results were not unanimous, for the lower the social scale of the children the larger was their rate of increase in stature. The increase in weight of the boys, however, was greatest in the case of those from the better schools and least in the case of the poorer children; but girls' weights, on the other hand, show the reverse. (*See* Table XVIII.)

TABLE XVIII.

SHOWING PERCENTAGE INCREASE FROM 5 TO 13 YEARS OF AGE.

| | Boys. | | Girls. | |
|---|---|---|---|---|
| | Heights. Per cent. | Weights. Per cent. | Heights. Per cent. | Weights. Per cent. |
| England and Wales.. | 37·8 | 100·0 | 40·5 | 113·0 |
| Nottingham (better) . | 36·3 | 98·0 | 37·7 | 103·8 |
| ,, (medium) . | 36·8 | 96·9 | 39·3 | 105·2 |
| ,, (poorer) . | 37·8 | 92·9 | 41·9 | 112·8 |

Further enquiry shows that whilst the poorer children all through their school life remain slightly below the average, the medium and better children do not maintain the superiority with which they commence at the age of five. Both heights and weights of boys and girls in the better and medium class schools show lower index numbers at the age of thirteen than they do at five. In other words, the curious results set forth above are an indication that there is a tendency towards deterioration at the higher ages of the better and medium class scholars. When further statistics are available, giving details of the stature and weight of children of different social classes, the figures for percentage growth may prove of considerable value, and if the tendency of better class children to deterioration at higher ages be general, and assuming that home conditions and circumstances remain the same, then the probable

conclusion will be that the school environment, being inferior to their out-of-school surroundings, acts prejudicially. There is evidence to show that, as regards poor children, though the school environment may be superior to their outside surroundings, the effect of the former set of influences does not prevent progressive deterioration as they grow older.*

In connection with the question of annual growth, reference may be made to Dr. Mary Williams' report on Tuberculosis of the Lungs.† Dr. Williams weighed a number of tuberculous children at frequent intervals, on the grounds that "there are commonly two definite ways in which the departure from full health is recognisable, apart from examination of the lungs, viz., failure to gain weight, and increased temperature."‡ Samples of the statistics obtained are given in the following table :

### TABLE XIX. (*a*).

SHOWING WEIGHT OF TUBERCULOUS CHILDREN AT DIFFERENT DATES.

| Age of Child, 6¾ Years. | | Age of Child, 12 Years. | |
|---|---|---|---|
| Date. | Weight (lbs.). | Date. | Weight (lbs.). |
| October, 1908 .. | 35 | November, 1908 .. | 72¾ |
| January, 1909 .. | 34 | April, 1909 . .. | 72¾ |
| November, 1909 .. | 37 | January, 1910 .. | 72¼ |
| May, 1910 .. .. | 43 | April, 1910 . .. | 73 |
| December, 1910 .. | 43 | May, 1910 .. .. | 72½ |
| | | June, 1910 .. .. | 73 |
| | | October, 1910 .. | 72 |

* *See* Tables II. and III., Appendix D.

† Contained in the Report of the Worcestershire County Council School Medical Officer for 1910.

‡ *Ut supra*, p. 125.

The first case above shows a slight loss of growth for three months, and a period of no growth for seven months. The second case exhibits small fluctuations, but on the whole no increase in weight for a period of two years. The following case, for which weights are given extending over a period of sixteen months, shows less than the average increase between the times of the first and last weighings, with marked fluctuations in the intervening period.

TABLE XIX. (*b*).

Age of Child, 10½ Years.

| Date. | Weight (lbs.). |
|---|---|
| May, 1909.. .. .. | 55 |
| July, 1909 . .. .. | 55½ |
| September, 1909 .. .. | 60 |
| October, 1909 .. .. | 60 |
| November, 1909 .. .. | 60½ |
| January, 1910 .. .. | 60 |
| March, 1910 .. .. | 60½ |
| April, 1910 .. .. | 57 |
| June, 1910 . .. .. | 58 |
| August, 1910 .. .. | 60½ |
| September, 1910 .. .. | 60 |

The rate of growth* is of such importance as an indication of physical condition that quarterly weighings of all children would be a great advantage, or, at any rate, of children suspected by the teacher of some kind of defect or ailment. It is necessary to point out, however, the rate of growth not only varies from year to year, as has already been

* "Good health, however, is not incompatible with small stature or low weight in *individual cases*. Of very great importance is any *sudden variation* from the normal standard either in height or weight, and any such variations should lead to careful examination, more especially with a view of detecting the onset of some insidious disease, such as consumption, or some other cause, such as mental overstrain."—Dr. George Mitchell, quoted in the First Report on the Medical Inspection of School Children in Scotland, 1913, p. 49.

shown, but varies also during any one year. It has been found, for example, that the weight of an average boy from nine to fifteen passes through three periods of change. The period of greatest growth is from August to the middle of December; following on which, until the end of April is a period of average growth, the interval of least growth being the next three months ending with July; and during the maximal period the daily gain is three times as great as in the middle period. On the other hand, the time of greatest growth in height coincides with the period of least growth in weight and *vice versa.**

Dr. Handford, School Medical Officer for Nottinghamshire County Council, strongly advocates the weighing of all children "at least once a year as part of the regular school curriculum," considering that "failure to gain weight since the last weighing would be very good ground for referring the child to the Medical Inspector for a thorough examination"—a suggestion which Sir George Newman endorses.†

The School Medical Officer of Edmonton, Dr. F. E. Rock, made an enquiry into the relation between parental neglect and the condition of children,‡ which may be briefly considered here. The table below shows the differences in the mean heights and weights of the neglected children and the whole of the children between five and six, and between thirteen and fourteen.

* *See* G. Stanley Hall, "Adolescence," Vol. I., p. 21.

† Chief Medical Officer, Board of Education, 1911 Report, p. 32.

‡ *See* Annual Report of the School Medical Officer for Edmonton, 1910, pp. 37, *et seq.*

## TABLE XX.

### Condition of Neglected Children (Edmonton).

| | Weight (lbs.). | Probable Error ± | Height (ins.). | Probable Error ± | Weight (lbs.). | Probable Error ± | Height (ins.). | Probable Error ± |
|---|---|---|---|---|---|---|---|---|
| | Boys between 5 and 6 | | | | Girls between 5 and 6. | | | |
| Neglected children | 35·7 | ·4 | 40·0 | ·3 | 35·6 | ·6 | 36·6 | ·2 |
| All children .. | 38·1 | ·1 | 40·4 | ·05 | 36·9 | ·1 | 40·0 | ·05 |
| Correlation* .. | ·22 | | ·08 | | ·16 | | ·30 | |
| | Boys between 13 and 14. | | | | Girls between 13 and 14. | | | |
| Neglected children | 73·0 | 1·1 | 54·1 | ·3 | 81·5 | 1·5 | 56·1 | ·4 |
| All children .. | 76·3 | ·3 | 55·5 | ·09 | 79·8 | ·4 | 56·5 | ·09 |
| Correlation .. | ·16 | | ·24 | | —·06 | | ·05 | |

There is, as the table indicates, a significant relation between neglect of children and their height and weight, the neglected children being lighter and shorter, though there is noticeable exception in the case of the weight of girls aged thirteen, whilst the differences between heights of neglected boys and all boys at five years of age is very slight.

* The correlation coefficient expresses the relation, if any, between parental neglect and physique. It gives a numerical value to the relation, so that one relation can be compared with another. If the relation between any two things, say between neglect of children and their intelligence, were one of absolute cause and effect, the correlation between the two would be found to be 1·0; if there were no relation at all it would be 0·0, and the correlation may have any value between 0 and 1, or in the opposite direction between 0 and — 1.

## CHAPTER V.

### THE HEALTH OF SCHOOL CHILDREN.

A GREAT deal of the valuable information included in the reports of school medical officers is of such a character as to be useless for comparative purposes. The standard of nutrition adopted varies from district to district; and there is no agreement as to what constitutes, for example, "bad" eyesight.

According to the Chief Medical Officer of the Board of Education: "Speaking generally it may be said that out of the 6,000,000 children registered on the books of the public elementary schools of England and Wales, about 10 per cent. suffer from a serious defect of vision, from 3 to 5 per cent, suffer from defective hearing, 1 to 3 per cent, have suppurating ears, 6 to 8 per cent. have adenoids or enlarged tonsils of sufficient degree to obstruct the nose or throat, and thus to require medical treatment, about 40 per cent. suffer from extensive and injurious decay of the teeth,* about 30 to 40 per cent. have unclean heads or bodies, about 1 per cent. suffer from ringworm, 1 per cent. from tuberculosis in readily recognisable form, from 1 to 2 per cent. are afflicted with heart disease, and a considerable percentage of children are suffering from a greater or less degree of malnutrition."†

It appears, therefore, that a large proportion of the children of the elementary schools are in need of medical attention for one reason or another.‡ Some diseases and

* Mr. J. A. Pease in his annual statement as to the work of the Board of Education (House of Commons, April 10th, 1913), gave the figure as 50 per cent.

† Chief Medical Officer, Board of Education, 1910 Report, p. 256.

‡ In Middlesex (County Council area) in 1910, 15,951 children were examined (of whom only 608 were "specials") and of the total number 17·5 per cent. were advised to consult a doctor, and 4·1 per cent. were advised to consult a dentist.—(*See* Report of the School Medical Officer of the Kent County Council, 1910.) In addition, one may suppose that there would be many more children suffering from minor ailments, not requiring medical attention.

defects appear to become more prevalent as school life proceeds. This is noticeably so with regard to defective vision, as the following example shows, compiled from the report of the School Medical Officer for Walthamstow for 1910.*

### TABLE XXI.

PERCENTAGE OF WALTHAMSTOW CHILDREN WITH GOOD VISION.

| Age. | Percentage with Good Vision. | | Numbers Examined. | |
|---|---|---|---|---|
| | Boys. | Girls. | Boys. | Girls. |
| 6— 7 | 99·0 | 97·4 | 217 | 278 |
| 7— 8 | 86·5 | 85·6 | 676 | 695 |
| 12—13 | 84·0 | 82·6 | 401 | 380 |
| 13—14 | 84·1 | 84·0 | 743 | 634 |

The case of heart defects appear to be similar, if the findings of the Worcestershire School Medical Officer be typical.†

### TABLE XXII.

PERCENTAGE OF HEART DEFECTS (WORCESTERSHIRE CHILDREN).

| Age. | Boys. | | | | Girls. | | | |
|---|---|---|---|---|---|---|---|---|
| | 1909. | | 1910. | | 1909. | | 1910. | |
| | No. Examined. | Percentage. | Percentage. | No. Examined. | No. Examined. | Percentage. | Percentage. | No. Examined. |
| 5–6 .. | 1,140 | 1·4 | 2·5 | 1,082 | 1,080 | 2·7 | 2·1 | 1,147 |
| 12 and over | 3,238 | 2·3 | 4·6 | 2,661 | 3,259 | 4·9 | 5·1 | 2,837 |

* Page 92.

† The figures are taken from the Worcestershire School Medical Officer's Reports for 1909 and 1910.

Many of the ailments referred to above undoubtedly exercise an injurious effect on physical development, and may, by lowering the standard of health and physique, render numbers of the adult population too inefficient to earn more than low wages. Adenoids, for example, "producing disease with far-reaching consequences to the health of the child, and subsequently of the adult," apparently retard growth, owing to their evil effects. Dr. Brown, Assistant Medical Officer for Surrey, who has investigated the consequences of adenoid growth on physique, states that in the case of children of five years old, "There is very little difference between the relative height and weight in the two groups. In the case of children aged seven years the child without adenoids has the advantage of ½ in. in height to 1 lb. in weight in the case of boys, and 1 in. in height and 1½ lbs. in weight in the case of girls, while among the older children the difference is still further marked, corresponding to ¾ in. in height and 2½ lbs. in weight in the case of boys, and to 2½ ins. in height and 9 lbs. in weight in the case of girls."* If there were no other differences in the two sets of children, the inferior physique of children with adenoids cannot be overlooked.† Dr. Stewart, School Medical Officer for East Suffolk, enquiring specially into association of enlarged tonsils with adenoid growths, concludes "that a child with enlarged tonsils and marked adenoids is two years behind the normal child in physique, height, weight, and mental capacity."‡ Defective teeth affect health injuriously, partly by the absorption of the foul products resulting from septic infection, and partly from unsatisfactory digestion as a consequence of the insufficient mastication of food. It is not possible to estimate the precise effects of bad teeth on physical development.

* Quoted in Chief Medical Officer, Board of Education, 1911 Report, p. 48.

† In Liverpool, adenoids and enlarged tonsils are less prevalent in the poor districts than in the better districts. *See* School Medical Officer's Reports, 1910, p. 98, and 1911, p. 92.

‡ Chief Medical Officer, Board of Education, 1909 Report (Cd. 5426), 1910, p. 43.

Malnutrition—quite apart from the presence of any specific disease—must be considered a prime cause of poor physique. In a well-nourished child we look for "a reasonable proportion between height and weight, a healthy skin, an expression revealing a nervous system in more or less full control, a red mucous membrane as a sign of good circulation, and an elastic and well-braced muscular system."*

The quotation from the Chief Medical Officer's Report for 1910, given above,† contains no estimate of the number of children suffering from malnutrition beyond "a considerable percentage." According to the President of the Board of Education, however, 10 per cent. of the elementary school children of England and Wales suffer in this way.‡ The distribution of these children is not clear cut, for though the proportion is relatively high in the industrial areas, it is by no means negligible in other areas. Further, "two children, each alike suffering from malnutrition, may have had the condition caused, in the one case mainly by insufficient food and general neglect; in the other by unsuitable feeding and pampering"; § that is to say, malnutrition is not confined to children of the poor, though the Chief Medical Officer of the Board of Education points out that the number suffering from such a condition rises "in poorer districts to a serious proportion."|| If one-tenth of the elementary school population as a whole be suffering from malnutrition —and the incidence is heavier amongst the poorer children, especially in the large towns, than amongst rural and better class children—it is clear that the condition of whole schools of poorer town children must be deplorable.

Dr. Crowley's investigations showed that in the school situated in the poorest districts of Bradford malnourished children "constituted about one-third of the whole."¶ The accompanying table, compiled by Dr. Crowley, shows

* Chief Medical Officer, Board of Education, 1908 Report, p. 43.

† P. 45.

‡ House of Commons, April 10th, 1913. *See* Chief Medical Officer's 1910 Report, pp. 30, 31. For London the figure is over 11 per cent.

§ Chief Medical Officer's 1908 Report, p. 44.

|| *Ibid.*, p. 44.

¶ "The Hygiene of School Life," by R. H. Crowley, 1910, p. 16.

"the distribution of the children arranged in accordance with the condition of their nutrition. Group A is composed of children from better-class districts, and Group B of those from the poorest."*

TABLE XXIII.

NUTRITION OF BRADFORD CHILDREN (CROWLEY).

| Nutrition. | Infant School. | | | | Upper School. | | | |
|---|---|---|---|---|---|---|---|---|
| | Group A. | | Group B. | | Group A. | | Group B. | |
| | No. | Per-cent-age. | Per-cent-age. | No. | No. | Per-cent-age. | Per-cent-age. | No. |
| Good or sufficiently good .. .. | 135 | 55 | 31 | 51 | 403 | 68 | 24 | 105 |
| Below normal .. | 81 | 36 | 35 | 58 | 149 | 25 | 43 | 18 |
| Poor or very poor | 20 | 9 | 34 | 57 | 41 | 7 | 33 | 142 |

An investigation made by Dr. Arkle, of Liverpool† brings out the extent of malnutrition among poorer children. He took the following types of schools:

(1) The Secondary Schools—"where the sons of the leading citizens of Liverpool are educated."

(2) *A.*—"A type of the best class Council School, where the parents of the children are well-to-do, and the children have mostly comfortable homes."

(3) *B.*—"A type of school where the parents are mostly of the labouring class or small shopkeepers. It was selected as a type for the children of the labouring classes, whose parents have constant employment."

(4) *C.*—"A type of the poorest class, where the parents of the children belong almost entirely to the unemployed or casual labour sections."

* *Ibid.*

† North of England Education Conference, 1907. Paper on "Medical Examination of School Children," by A. S. Arkle. *See* Appendix C, Table XII.

The results obtained were as follows, the figures representing percentages of the total children examined :

TABLE XXIV.

NUTRITION OF LIVERPOOL CHILDREN (ARKLE).

| | Good. | | Fair. | | Poor. | | Bad. | |
|---|---|---|---|---|---|---|---|---|
| | B. | G. | B. | G. | B. | G. | B. | G. |
| Secondary Schools .. | 100 | — | — | — | — | — | — | — |
| Council Schools " A " .. | 80 | 91·6 | 17·8 | 8 | 1·3 | — | — | — |
| Council Schools " B " .. | 28·5 | 65·7 | 60·1 | 33·9 | 9·7 | ·7 | ·7 | — |
| Council Schools " C " .. | 10·5 | 16·0 | 35·3 | 52·5 | 48·6 | 28·6 | 2·4 | 1·8 |

The extent of this evil may be larger than our present knowledge appears to show. In Sir George Newman's Report for 1911* the percentages of malnourished children are set forth for a number of administrative areas, showing that whilst in Glamorganshire the number of subnormal scholars is considered to be 6·4 per cent., in Westmorland the figure is stated as 17·4 per cent., and in Staffordshire as 19·2 per cent. Amongst urban areas Walthamstow and Warrington are alleged to contain only 0·7 and 0·8 per cent. respectively of malnourished children, though the School Medical Officer of Tynemouth finds 21·8 per cent. The absence of an absolute standard of nutrition has already been noted. Differences of opinion apparently exist, but it is clear that the School Medical Officers of Westmorland, Staffordshire and Tynemouth found conditions which warranted them in considering that something like one-sixth to one-fifth of the children examined were suffering in some degree from malnutrition. Where the percentage of ill-nourished scholars is very low, therefore, it seems that the standard of nutrition adopted has been somewhat low, and that, taking the country as a whole, not merely 10 per cent., but probably a number approaching 20 per cent. show perceptible signs of malnutrition. If this be so, then the

* Page 23.

fraction of poorer town children suffering in this way must indeed be large, and the average physical development of the child population of the elementary schools must be in some degree lower, as a consequence, than it would otherwise be. The question of the cause of "the most important of all physical defects from which school children suffer," to use the words of Sir George Newman,* is, therefore, one of considerable importance. *Prima facie* it would seem that there is a vicious circle; a considerable proportion of the children of the poor suffer from malnutrition, and because of the mental† and physical handicap imposed by this condition they will in all likelihood remain poor. Several school medical officers have made a special enquiry into details as to the cause of malnutrition. Dr. Badger, of Wolverhampton, in his routine examination of children aged five and thirteen, found 18·1 per cent. malnourished. In 131 cases he endeavoured to estimate the main factor in causing the condition, with the following results:

TABLE XXV.

CAUSES OF MALNUTRITION—WOLVERHAMPTON CHILDREN (DR. BADGER).

| | Number of Children. | Per cent. |
|---|---|---|
| 1. Influence and reaction of disease .. | 49 | 37·4 |
| 2. Strong evidence of neglect, dirt, or drink as cause .. .. .. | 26 | 19·8 |
| 3. Defective feeding, due to ignorance or poverty . .. .. .. | 25 | 19·1 |
| 4. Overwork and insufficient sleep .. | 11 | 8·4 |
| 5. Convalescing from recent disease .. | 9 | 6·9 |
| 6. Defective heredity .. .. .. | 6 | 4·6 |
| 7. Pampering .. .. .. .. | 4 | 3·0 |
| 8. Excessive growth .. .. .. | 1 | ·8 |
| Total cases .. .. .. | 131 | 100 |

* Chief Medical Officer, Board of Education, 1910 Report, p. 26.

† The percentage of mentally dull is "considerably larger among malnourished children than among children generally."—(Chief Medical Officer's 1911 Report, p. 24.) Dr. Badger concludes that at the age of thirteen it is 25 per cent. in Wolverhampton, as compared with 15·5 per cent. in the case of "all scholars examined aged thirteen."—(*Ibid.*).

Dr. Badger's conclusions are "that malnutrition is a condition that affects all classes; that it has a close association with disease; that much of it being associated with ignorance and defective hygiene is due to preventable causes; that poverty operates powerfully in its production, but that in view of the number and diversity of the factors producing malnutrition the former may not occupy, *per se*, the prominent position that is sometimes popularly assigned to it."*

Dr. Butcher, the School Medical Officer for Bedfordshire, found in his administrative area that 23·7 per cent. of the "urban" boys and 22·8 per cent. of the girls, and 22·1 per cent. of the "rural" boys and 18·5 per cent. of the girls, were suffering from malnutrition, which he assigns to the following causes:

(1) Inherent lack of vitality.
(2) Insufficient food.
(3) Improper food.
(4) Malassimilation of food (due to illness).
(5) Unhealthy home conditions.
(6) Insufficient sleep.
(7) Exhausting work outside school hours.†

In Fenton the School Medical Officer, Dr. Hughes, reports that 114, out of a total of 1,664 children suffered from "bad" nutrition (or 6·8 per cent.), and in respect to these he gives some detailed particulars, summed up as follows: "Thus of 114 cases of 'bad' nutrition, in 64 per cent. the parents appear to be in good circumstances, in 35 per cent. poor, in 30 per cent. the house was either only moderately clean, or dirty or overcrowded, in 11 per cent. the father is working short time, and in 10 per cent. there was evidence of drunken habits on the part of one or both parents."‡

In 1910 and 1911 investigations were made in Middlesex into the question. In the latter year an analysis was made of 167 cases of defective nutrition among children in the

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* Quoted in Chief Medical Officer, Board of Education, 1911 Report, p. 25.
† *Ibid.*, p. 30.
‡ Chief Medical Officer, Board of Education, 1910 Report, p. 28.

north and north-west, a district of a suburban residential character. The causes given are as follows:

TABLE XXVI.

CAUSES OF MALNUTRITION (MIDDLESEX, 1911).

| | Per cent. |
|---|---|
| 1. Poverty and neglect .. .. .. .. | 23·3 |
| 2. Rickets .. .. .. .. .. .. | 11·3 |
| 3. Adenoids .. .. .. .. .. .. | 7·2 |
| 4. Lung affection (probably tuberculosis) .. .. | 5·4 |
| 5. Digestive disorder . .. .. .. .. | 6·4 |
| 6. Intestinal parasites .. .. .. .. | 3·6 |

"Of the remaining cases, 7·2 per cent. appeared to be associated with some previous or present condition of ill-health, to account for which no organic mischief could be found at the time of inspection. In 33 instances no obvious cause could be assigned to the condition."*

In 1910, 570 cases of malnutrition amongst children in the southern area of Middlesex, a district which is mainly rural and semi-rural, were reported upon by Dr. Chate.† The results obtained are summarised below.

TABLE XXVII.

CAUSES OF MALNUTRITION (MIDDLESEX, 1910).

| | Boys. Per cent. | Girls. Per cent. |
|---|---|---|
| Poverty .. .. .. .. .. | 22·4 | 21·6 |
| Neglect and Poverty .. .. .. | 7·1 | 4·5 |
| Intestinal parasites .. .. .. | 14·3 | 15·9 |
| Adenoids .. .. .. .. | 5·5 | 5·7 |
| Various combinations of adenoids, poverty, rickets, worms, carious teeth, (any combination of two or more of them) .. .. .. .. .. | 6·9 | 5·7 |
| Rickets .. .. .. .. .. | 4·8 | 3·0 |
| Carious teeth .. .. .. .. | 8·1 | 8·7 |

* Chief Medical Officer, Board of Education, 1911 Report, p. 30.

† *See* Annual Report for 1910 of the School Medical Officer of the Middlesex County Council, pp. 52–63.

In addition, 2·3 per cent. of the cases of malnutrition were caused by improper diet. A certain number of children suffering from malnutrition was seen in whom the condition could not be ascribed to any of the foregoing causes. Other causes stated are:

| | Cases. |
|---|---|
| Overcrowding, or ill ventilation of rooms at home .. | 13 |
| Tuberculosis .. .. .. .. .. .. | 16 |
| Chronic bronchitis .. .. .. .. .. | 13 |
| Overwork and insufficient sleep .. .. .. | 10 |
| Gastric conditions .. .. .. .. .. | 11 |
| Premature birth, &c. .. .. .. .. .. | 11 |
| Constipation .. .. .. .. .. .. | 10 |
| Congenital syphilis .. .. .. .. .. | 8 |
| Deformity .. .. .. .. .. .. | 2 |
| Rheumatism and heart disease .. .. .. | 6 |

In dealing with the more important causes Dr. Chate makes some interesting observations. Referring to intestinal parasites, he says: "My observations lead me to conclude that dirt plays a large part in infection."* "Adenoids seem more common in the poorer classes, and it seems possible that the defective hygienic conditions that accompany poverty have much to do with this causation. I refer especially to overcrowding and want of fresh air in the houses. Under the circumstances I found it difficult to dissociate cases due to adenoids from cases due to conditions accompanying adenoids."† Further, Dr. Chate points out whilst not every child who has had rickets in early life suffers from defective nutrition during school-age, yet "the evidence collected points to the conclusion that there is a definite group of cases of defective nutrition in which the only discoverable cause is the evidence of previous rickets."‡ Unsuitable food is assigned as one cause, and it is Dr. Chate's opinion that "the main cause of this improper diet is undoubtedly poverty," though "there are grounds for thinking that another factor is the ignorance of the parents."§

Though the physique of Scottish school children has not

* *Ibid.*, p. 56. ‡ *Ibid.*, p. 59.
† *Ibid.*, p. 57. § *Ibid.*, p. 61.
For incidence of rickets amongst different classes of children, *see* Dr. W. Hall's investigation (Appendix C., Table VI.).

been dealt with in this enquiry, the conclusions of some of the Scotch school medical officers regarding malnutrition may be cited in support of the statements of the English school doctors. According to Dr. Bridge (Dunfermline), the causes are lack of sleep, work done by children out of school hours, and defective teeth.* Dr. Meikle (Edinburgh) says malnutrition is "due in most cases to home conditions: insufficient or improper food, insufficient clothing, crowded accommodation, want of sleep, verminous conditions, and other evidences of neglect all contributing to it."† Dr. Ginnette (Greenock) puts first improper feeding, though he adds that "lack of sufficient sleep, defective teeth, and the employment of children out of school hours are further factors interfering with the nutrition of the children."‡ In the County of Aberdeen, Dr. Mitchell found that "of 6,473 children examined, 0·51 per cent. showed defective nutrition from under-feeding, 3·87 showed defective nutrition from other causes—making the total of 4·38 per cent. . . . The under-feeding, with few exceptions, was due to poverty, the children otherwise being clean and well cared for. These underfed children in many instances belonged to large families with only one wage-earner, and that wage not a high one."§ Other school medical officers express views in agreement with those already stated.

Noticeable amongst the causes of malnutrition is the working of children out of school hours, and the available evidence goes to show that this form of child labour is undoubtedly responsible for a considerable amount of physical defect. Dr. Thomas's well-known investigation, in 1905, into the physical condition of 400 employed schoolboys in London showed that fatigue signs, anæmia, severe nerve signs, deformities and severe heart signs, all increased with an increase in the number of hours worked per week.|| In 1911 Dr. Brown (Assistant School Medical Officer, Surrey)

* First Report on the Medical Inspection of School Children in Scotland, 1913, pp. 49, 50.

† *Ibid.*, p. 50.

‡ *Ibid.*, p. 50.

§ *Ibid.*, p. 51.

|| *See* summary given in Chief Medical Officer, Board of Education, 1911 Report, p. 250.

investigated the cases of 348 boys aged 13 who were employed out of school hours.* His general conclusions are that occupations entailing very early rising, hurried meals and late going to bed interfere with general development, but that the employment of boys as house boys and for outdoor occupations on Saturdays only does not appear to have any bad effect. In his opinion a moderate amount of occupation out of school hours, restricted as to hours, time for meals, etc., should not be detrimental to health and growth. He observes that slight spinal curvature was found to be more frequent among paper boys than among those employed otherwise, owing to the heavy bundles of papers carried. Dr. Corfield (Colchester)† and Dr. Outred (Gravesend)‡ also report cases of impaired health arising from employment. Dr Mabel Russell (Bromley) remarks that many of the boys working out of school hours "are of poor phyisque and badly nourished, not often from want of sufficient food, but because the food taken is never properly assimilated."§ The School Medical Officer of Liverpool found that "in the majority of instances no ill effects on the physical condition were observable, but in some cases the children were obviously not equal to the extra tasks imposed upon them by the employment."|| In Abertillery seven cases of well marked neurasthenia were noted, and also "many less pronounced instances of nervous exhaustion," attributed by the Medical Officer to over-employment out of school and want of sleep.¶ The importance assigned by the Scotch school medical officers to out-of-school employment as a cause of malnutrition has already been noticed.** Leaving aside all economic issues, there are strong grounds, from the point of view of health and physique, for the more effective regulation of hours of work, time for meals, etc.††

* *Ibid.*, pp. 251–253. † *Ibid.*, pp. 253, 254. ‡ *Ibid.*, p. 254.

§ *Ibid.*, p. 256. || Liverpool School Medical Officer's Report, 1910, p. 65.

¶ Abertillery School Medical Officer's Report, 1910, p. 143.

** The evidence relating to the effect of employment out of school hours would be greatly strengthened if school medical officers would investigate cases of child labourers more carefully, recording height, weight, and other data at quarterly intervals.

†† For examples of children working out of school hours with injurious effects, *see* Report of School Medical Officer for Westmorland County Council, 1909, pp. 50, 51.

The results of half-time labour on physique have been considered above,* and brief mention may now be made of the effects on health. That the health of the "half-timer" suffered as a consequence of his labour has been many times both asserted and denied.† An article published in the *Schoolmaster*,‡ under the title "Physical deterioration of half-timers," discloses some remarkable figures of physical defect. "A careful record of the Medical Officer's returns during the years 1910, 1911, 1912 was kept in a typical boys' school in Lancashire where half-time pupils attended. All cases of observed physical defect of eye, ear, throat, etc., and organic or general weakness noted by the doctor as requiring medical treatment were taken into consideration, with the following results":

TABLE XXVIII.

HALF TIME BOYS (LANCASHIRE SCHOOL).

| | 1910. | 1911. | 1912. |
|---|---|---|---|
| Percentage of physically defective full-time scholars .. | 6·1 | 12·6 | 15·1 |
| Percentage of physically defective half-time scholars | 57·1 | 77·9 | 40·0 |

Inquiry was then made in a girls' school, and three mixed schools, with results as shown:

TABLE XXIX.

PERCENTAGE OF PHYSICALLY DEFECTIVE PUPILS (LANCASHIRE SCHOOLS).

| | 1910. | | 1911. | | 1912. | |
|---|---|---|---|---|---|---|
| | Full-Time. | Half-Time. | Full-Time. | Half-Time. | Full-Time. | Half-Time. |
| Girls' school .. | 6·7 | 47·0 | 5·9 | 17·3 | 6·2 | 18·1 |
| Mixed Dept. I. | 8·7 | 10·0 | 6·7 | 15·3 | 5·1 | 50·0 |
| Mixed Dept. II. | 6·8 | 50·0 | 7·9 | 47·6 | 5·7 | 53·3 |
| Mixed Dept. III. | 4·3 | 29·4 | 8·6 | 38·4 | 4·3 | 35·5 |

* Chap. IV.
† *E.g.*, *see* Report of Departmental Committee on Partial Exemption.
‡ February 15th, 1913.

The average percentage of physical defect for all the schools was worked out and the following results obtained:

TABLE XXX.

PERCENTAGE OF PHYSICALLY DEFECTIVE PUPILS (LANCASHIRE SCHOOLS).

| | 1910. | 1911. | 1912. |
|---|---|---|---|
| Full time scholars .. | 6·2 | 8·4 | 7·1 |
| Half-time scholars .. | 39·0 | 35·8 | 38·0 |

"To a great extent," the article continues, "the occasional notable contrasts in the statistics relating to some of the half-time pupils may be accounted for by the times at which the medical examinations were made, a far greater proportion of physical defect being noted when the pupil had been going half-time for six months or more."*

At Oldham, in spite of the statistics for height and weight showing the full-time scholars in an unfavourable light, Dr. Lucy Pinniger considers that "generally the condition of the half-timer is markedly inferior to that of the full-timer. He is not so bright or responsive in appearance, he is usually less clean and tidy, and his nutrition is not as good as that of the full-time scholar."† "Many children," she writes, "are working in the mills, who in my opinion are physically quite unfit for the strain and condition of the work. Children with the tubercular diathesis, who will sooner or later develop phthisis pulmonalis, cases of very marked physical deformity, of seriously defective vision and of definite heart disease, are among these."‡

In Clitheroe many of the older scholars work half-time,

* It is unfortunate that the article does not state the number of pupils examined, and the number of cases and kinds of defects found. Statistics illustrating that the amount of physical defect and disease increased with the length of time the boys and girls had been in employment would have been most valuable.

† Oldham School Medical Officer's Report, 1909, p. 81.

‡ *Ibid.*, p. 82.

and "in most of these cases the fact is reflected in the condition of the children, some degree of anæmia or faulty nutrition being noticeable."* On the whole, school medical officers who have enquired into the question agree that half-time labour is often attended with injurious affects on health, and is associated with malnutrition.

In malnutrition we have undoubtedly one of the most potent causes of defective physique, and the investigations outlined above will help in elucidating the causes, though the school medical officers are not unanimous on the question. It has already been pointed out that the proportion of ill-nourished children increases as we proceed towards the poorer strata of society. It cannot reasonably be urged that this is due solely, or even mainly, to hereditary influences, for the great majority of infants are born healthy.† Those born unhealthy will die in greater numbers than the healthy infants, and although many apparently healthy babies may be hereditarily predisposed to contract certain ailments, it does not follow that these infants will necessarily become unhealthy children unless environmental influences favour the development of those diseases. It seems clear, therefore, that malnutrition is in a large degree the result of poverty and its concomitants—heavier incidence of disease, unhealthy conditions, overcrowding, ignorance, etc. If the causes set forth above by school medical officers be analysed, it is obvious that the various factors are, in the large proportion of cases, the accompaniments of poverty; for though neglect, ignorance, and overcrowding are not necessarily confined to the very poor, they are much more frequent amongst this section of society. In the case of specific diseases, they are on the whole more widespread among the children of the poor than among the rest of the school population, or, at any rate, their consequences are more serious. Consequently, instead of the proportion of malnutrition ascribed to "poverty" (which apparently is taken to mean insufficient food and clothing) being between 20 and 30 per cent., it is very

* Clitheroe School Medical Officer's Report, 1910, p. 19.
† *See* "Infant Mortality" by G. Newman, 1906, p. 87.

probable that poverty (used in the sense of covering the accompanying conditions of lack of means) accounts for much more malnutrition than the enquiries detailed above seem to show. Even on a low estimate it appears likely that from three-fifths to three-quarters of the malnutrition amongst elementary school children is directly traceable to poverty.

In this connection, the investigation of Dr. Larkins in S.W. Surrey into the relation between the wages of parents and the nutrition of their children may be noticed.* He inquired into the wages of the parents of all the children aged thirteen that he examined, noting at the same time the number of children in the family. The scholars were classified according to the wages of the parents, with the following results:

TABLE XXXI.

NUTRITION OF CHILDREN AND THE WAGES OF PARENTS (S.W. SURREY.)

| Average Weekly Wages. | Average Weight in Lbs. of Children Aged Between 13 and 14. | General Condition of the Children. | | | Average Number of Children in Family. | | |
|---|---|---|---|---|---|---|---|
| | | Very Good. | Aver'ge. | Poor. | Total. | Under 14. | Over 14. |
| | | % | % | % | | | |
| Over 25s. | 99·6 | 50 | 46 | 4 | 5·5 | 3·4 | 2·1 |
| 20s. to 25s. | 84·1 | 15 | 73 | 11 | 5·7 | 2·8 | 2·9 |
| 18s. to 20s. | 77·0 | — | 56 | 44 | 6·3 | 3·8 | 2·5 |
| 16s. to 18s. | 72·6 | — | 42·5 | 57·5 | 6·6 | 4·2 | 2·4 |
| 14s. to 16s. | 74·3 | — | 22 | 78 | 7·6 | 2·9 | 4·7 |
| 12s. to 14s. | 70·8 | — | 20 | 80 | 3·6 | 2·2 | 1·4 |

It will be observed that the weight of the children falls with the wages. The 16s. to 18s. a week group, however, shows a break which might be explained by reference to the end columns, where it is seen that the number of children under fourteen is abnormally large. On the whole, the weight of the children in families where the father's wages is less than a pound a week falls below the average for elementary school children. As one would expect, the general condition of the children varies with the parent's

* "The Influence of Wages on the Child's Nutrition," by Dr. F. E. Larkins, Assistant M.O.H. Warwickshire and late Assistant S.M.O. Surrey, in *The Medical Officer*, 17th December, 1910.

wage, malnutrition increasing with poverty. "It is perfectly evident," says Dr. Larkins, "that the nutrition and consequently the general health of the child, and its powers of resistance to disease, are vitally dependent upon its father's wage," a conclusion which emphasises that already reached above as to the connection between malnutrition and poverty.

Of the other causes of defective health and physique, many, though in themselves quite minor ailments (eradicated in the nurseries of the well-to-do, or where necessary receiving immediate medical attention) may result in permanent impairment of physical efficiency. As Sir George Newman has said, "The conditions of life, both in respect of personal hygiene and of environment, which result in a high mortality among infants under one year of age, lead at the same time to a high degree of sickness and disablement among children of school age; and in the same way, and probably in even greater degree, sickness and disease of children lead to disease and disablement among adolescents and adults"; and again, "Many of the diseases and physical disabilities of the adolescent and the adult spring directly out of the ailments of childhood. For example, malnutrition, 'debility,' dental caries, adenoids and measles in childhood are the ancestry of tuberculosis in the adult. They predispose to disease, and are, in a sense, both its seed and soil; and thus it is that tuberculosis in the adult —which may be taken as a type and example of preventable disease—is in large part the direct development of disease in the child."*

The Education (Administrative Provisions) Act, 1907, by establishing a school medical service, made possible the development of methods for dealing with the huge mass of disease and physical defects which is known to exist amongst school children, and for supervising the health of the six million children in the elementary schools of England and Wales. Since its inception this new arm of the national health service has been engaged in observation and experiment, in developing schemes of administration, and in

* Chief Medical Officer, Board of Education, 1910 Report, p. 1.

working out the relations between the school medical service and the public health service. Four years ago the school medical service was, to all intents and purposes, non-existent; it now makes individual examinations of well over a million children a year. It would seem preposterous to expect at the present moment to see any definite beneficial results from this new piece of social machinery, absorbed as its administrators have been in the development of a technique; and yet it is possible to show evidence that the school doctor is abroad.

In the case of a great many local authorities, which have been satisfied with a more or less perfunctory performance of their duties under the Education (Administrative Provisions) Act, no results can be forthcoming. One must turn to those towns which by their school meals, medical and dental clinics, open-air schools and classes, have seriously attempted to grapple with the problems of juvenile health and physique. We may take as an example the city of Bradford,* where, if anywhere, the effects of these recent educational developments may be seen. Bradford is well known as the town which has made the most complete arrangements for school feeding. Under Dr. Crowley and his successor, Dr. Williams (who formerly assisted Dr. Crowley), there has been a continuous policy of development. In 1908 a school clinic was established, which now embraces eye and dental treatment. The amount of work accomplished by the clinic may be gauged from the following table :—†

TABLE XXXII.

BRADFORD SCHOOL CLINIC.

| | Total No. of Children treated. | Examinations only. | Infectious Disease. | Total No. of Attendances. |
|---|---|---|---|---|
| 1908 | 841 | ——Figures not given | | —— |
| 1909 | 2,323 | 999 | 326 (3 months) | 145,16 |
| 1910 | 3,676 | 1,720 | 1,052 | 19,315 |
| 1911 | 5,064 | 1,710 | 945 | 20,325 |

* The following account of the Bradford Medical Service is reprinted with the kind permission of the Editor from "The School Child," August, 1912.

† All the statistics given are from the Reports of the School Medical Officer for 1908, 1909, 1910, and 1911.

In August, 1908, an open-air school was instituted* accommodating 40, which in the following year was enlarged to find room for 120 children.

At present the staff consists of the school medical officer, two assistant medical officers (one of whom is a woman), a school dentist, and two school nurses. The work accomplished during 1911 may be summarised from the report for that year as follows:—

"3,524 children have been examined by the medical staff on account of defective vision.

"The school nurses have examined a further 25,495 scholars for any unsatisfactory condition of the hair, clothing, ears or eyes.

"7,719 cases have been dealt with at the school clinic; 5,064 of these actually received treatment. 839 pairs of spectacles were provided. 285 cases received X-Ray treatment.†

"945 children were examined on account of the infectious diseases, diphtheria and scarlet fever. 1,966 children have received dental treatment. The condition of the school children has vastly improved. Running ears, sore eyes, ringworm and verminous condition of the head and clothing have become much less common.

"Infectious diseases are less prevalent. Diphtheria has not assumed epidemic form for years back, scarlet fever has declined steadily for three years.

"There has been a considerable saving in attendance at school. The X-Ray cases alone have saved over 70,000 attendances during the year.‡ Nearly 30,000 fewer attendances were missed on account of scarlet fever during 1911 than during 1910.

"The fact is illustrated that medical inspection when accompanied by a scheme for treatment does not have the effect of reducing the average attendance, for whilst the

* For a description of this see "The Crusade," November, 1911.

† For ringworm.

‡ By the drug treatment for ringworm, it is estimated that each child loses 287 attendances. By the X-Ray treatment the average attendances lost per child in 1911 was 35·3.

children is due, not to accident, to the deliberate efforts of the local authority.

The following summaries relating to particulars, some of which are not capable of exact measurement, show the changes brought about between 1908 and 1911. The numbers given are percentages of the number of children examined.

TABLE XXXV.

| — | 1908 | 1909 | 1910 | 1911 | 1908 | 1909 | 1910 | 1911 |
|---|---|---|---|---|---|---|---|---|
| Ages .. | 3–8 | 3–7 | 3–8 | 3–8 | 13 | 13 | 11–13 | 12–1 |
| General Appearance. | | | | | | | | |
| Healthy .. .. | 72 | 70·5 | 78·5 | 77·1 | 55·5 | 67·5 | 78 | 81·2 |
| Delicate, Anæmic .. | 25 | 28·5 | 21·0 | 22·3 | 40 | 32 | 22 | 18·7 |
| Neglected .. .. | 3 | 1 | ·5 | ·6 | ·3† | ·5 | — | ·1 |
| Nutrition : | | | | | | | | |
| Good .. .. | 41·5 | 50 | 65·6 | 65·8 | 37 | 46 | 76 | 73 |
| Below Normal .. | 42·5 | 37·5 | 28·4 | 31·5 | 47·5 | 41 | 22 | 25·6 |
| Poor .. .. .. | 16 | 12·5 | 6 | 2·7 | 15·5 | 13 | 2 | 1·3 |
| Cleanliness of Body : | | | | | | | | |
| Clean .. .. | 87 | 98·2 | 92·6 | 96·4 | 90 | 97·3 | 94 | 96·5 |
| Dirty .. .. | 13 | 1·8 | 2·4 | 1·9 | 10 | 2·7 | 3 | 2·6 |
| Fleabitten .. .. | * | * | 5 | 1·7 | * | * | 3 | ·9 |
| Cleanliness of Head : | | | | | | | | |
| Clean .. .. | 72 | 76·5 | 80·6 | 82·0 | 80 | 69·3 | 72 | 77·8 |
| Nits present .. | 27 | 21·5 | 16·3 | 16·2 | 19.25 | 28·9 | 26·5 | 20·7 |
| Pediculi present .. | 1 | 2 | 3·1 | 1·8 | ·75 | 1·8 | 1·5 | 1·5 |
| Clothing : | | | | | | | | |
| Good .. .. | 42 | 65 | 70 | 80·3 | 40 | 66 | 76·5 | 82·2 |
| Average .. .. | 37 | 21 | 16 | 12 | 40 | 25·5 | 13·5 | 11·4 |
| Poor or Very Poor .. | 21 | 14 | 14 | 7·7 | 20 | 12·5 | 10 | 6·4 |
| Footgear : | | | | | | | | |
| Good .. .. | 76 | 84·5 | 85 | 88·7 | 80 | 89 | 90·5 | 91·2 |
| Poor .. .. .. | 18 | 14 | 14 | 9·2 | 8 | 10 | 8·5 | 6·6 |
| Very Poor .. .. | 6 | 1·5 | 1 | 2·1 | 12 | 1 | 1 | 2·2 |

There are difficulties in the way of comparing the nutrition, etc., of children in different areas coming under the observation of different medical inspectors, with differing ideas of what constitutes good nutrition and so forth. But provided the standard adopted is adhered to, a comparison of children in the same area, examined by the same medical officer or officers, will be fairly trustworthy, for though the

* Particulars are not given in 1908 and 1909.

† 1·5 per cent. are classified as " Undersized."

personal element is not eliminated, it is constant throughout. Even though the standards adopted were assumed to vary somewhat from year to year, they would not be likely to deteriorate steadily with respect to the many different conditions observed above—nutrition, cleanliness, clothing, etc. It will be seen that not only has the clothing and footgear of the Bradford children improved, but also the standard of cleanliness has been considerably raised—a fact that can readily be believed when one remembers the many thousands of examinations made each year by the school nurses. The nutrition of the Bradford scholars shows remarkable improvement, for whereas in 1908 nearly three-fifths of the children were below the normal and of poor nutrition, in 1911 only about one-third can be so described.

It seems certain, therefore, that even at this early stage when the task is pursued with thoroughness and vigour, the provision of school meals and the establishment of a school medical service are justified by results. If those local authorities which have fulfilled merely the minimum requirements of the Board of Education, at a minimum expenditure of money and effort, have little to show for what they have done, the fault lies in their failure to grasp the importance of a comprehensive programme, such as has been conceived and to a large extent carried out at Bradford. The pity of it is that after all the thought, labour, and money so generously expended, the bulk of the children become "half-timers." One out of every seven children in the Bradford Elementary Schools is a "half-timer." The majority, on attaining the age of twelve, enter the mills, working half the day and filling in the remainder of the day at school, because the law will not allow them to work any longer. Any day in Bradford you will find between five and six thousand of these child labourers engaged mainly in employment in the textile industry, with results on their physical development which have already been examined.

It is now generally agreed that sickness is one important cause of poverty and destitution; it is further agreed that much of the ill-health and physical inefficiency amongst the adult population is a direct consequence of disease and

defects amongst children. It is reasonable, therefore, to conclude that one of the most valuable agencies in the prevention of destitution and poverty is the school medical service, whose function it is, in the first instance, to accumulate exact knowledge of the physical condition of school children, the kinds and extent of various ailments, their incidence amongst different social classes, and the extent to which they are due to school life, or to home conditions. In the next place, it will be necessary, on the foundations of the knowledge thus obtained to decide, amongst other things, on what modifications in school life and organisation are required, what types of "clinic" are most desirable, and what forms school feeding shall take. It is quite certain that, following on the present experimental clinics and open-air schools, there must be drastic educational changes if we are to ensure a healthy and vigorous adult population. The effects of these changes will not be confined within the school, but will react favourably upon the out-of-school environment. It must be admitted, however, that the unnecessarily low standard of health of the community cannot be raised to a high level merely through the instrumentality of the school medical service and its co-operating agencies. Low wages, and bad housing, on the one hand, and the marriage of the unfit on the other, are responsible for much disease and ill-health, which the influence of the school cannot directly prevent. The steady elevation of the national standard of health is therefore intimately bound up with other sides ot the "social problem." A recognition of this fact does not weaken the case for the development of open-air schools, and school clinics, but rather strengthens the case for the imperative need of far-reaching reforms in other directions, which will aid and complete the silent revolution already going on in our schools.

# APPENDIX A.

NOTE.—The reliability of the final index numbers given in the table below varies greatly. For convenience, they have been printed in three different kinds of type. The figures in ordinary type may be considered fairly reliable; those in heavy type are, so far as can be judged, unquestionably so; whilst the italics represent index numbers of varying degrees of doubtfulness, and little reliance can be placed upon them.

INDEX NUMBERS.

| Name of Place. | Boys: | | Girls: | | Average. |
|---|---|---|---|---|---|
| | Height. | Weight. | Height. | Weight. | |
| BEDS: | | | | | |
| Bedfordshire C.C. .. | 100·4 | 104·0 | 100·9 | 104·8 | 102·5 |
| BERKS: | | | | | |
| Berkshire C.C... .. | 100·9 | 100·7 | 101·6 | 102·8 | **101·5** |
| Newbury .. .. | 101·0 | 100·5 | 101·6 | 103·5 | *101·7* |
| CAMBS: | | | | | |
| Cambridge .. .. | 98·7 | 95·2 | 99·2 | 97·8 | **97·7** |
| CHESHIRE: | | | | | |
| Birkenhead .. .. | 98·4 | 98·3 | 98·5 | 98·7 | **98·5** |
| Chester .. .. | 99·2 | 96·8 | 99·8 | 96·4 | *98·1* |
| CUMBERLAND: | | | | | |
| Cumberland C.C. .. | 99·5 | 99·5 | 99·9 | 100·9 | **100·0** |
| Carlisle .. .. | 98·3 | 97·3 | 97·6 | 95·0 | 97·1 |
| Workington .. .. | 101·4 | 101·1 | 101·2 | 100·2 | *101·0* |
| DEVONSHIRE: | | | | | |
| Plymouth .. .. | 100·4 | 99·6 | 100·4 | 101·5 | 100·5 |
| DORSET: | | | | | |
| Dorset C.C. .. .. | 101·6 | 104·3 | 101·9 | 104·6 | **103·1** |
| DURHAM: | | | | | |
| Durham C.C. .. .. | 96·8 | 98·5 | 98·1 | 98·0 | **97·9** |
| Darlington .. .. | 99·1 | 98·0 | 99·0 | 97·0 | **98·3** |
| Gateshead .. .. | 97·0 | 94·7 | 95·9 | 93·8 | *95·4* |
| Jarrow: | | | | | |
| 1909 .. .. .. | 97·1 | 94·4 | 97·7 | 94·3 | 95·9 |
| 1910 .. .. .. | 97·3 | 94·9 | 97·7 | 93·3 | **95·8** |
| South Shields: | | | | | |
| 1909 .. .. .. | 98·0 | 94·0 | 97·2 | 98·5 | 96·9 |
| 1910 .. .. .. | 97·0 | 93·5 | 98·6 | 95·1 | 96·1 |
| Sunderland .. .. | 95·9 | 91·5 | 96·0 | 91·3 | *93·7* |

INDEX NUMBERS—*continued.*

| Name of Place. | Boys: | | Girls: | | Average. |
|---|---|---|---|---|---|
| | Height. | Weight. | Height. | Weight. | |
| ESSEX: | | | | | |
| Essex C.C. .. .. | 101·1 | 100·6 | 101·3 | 101·6 | **101·2** |
| Colchester .. .. | 100·4 | 99·4 | 100·0 | 99·5 | **99·8** |
| East Ham .. .. | 100·2 | 98·2 | 99·7 | 99·3 | **99·4** |
| Ilford .. .. .. | 102·4 | 102·8 | 102·8 | 102·7 | 102·7 |
| Leyton .. .. | 100·6 | 98·3 | 100·9 | 99·7 | 99·9 |
| FLINT: | | | | | |
| Flint: | | | | | |
| Urban .. .. | 100·3 | 99·3 | 100·7 | 100·9 | 100·3 |
| Rural .. .. | 101·0 | 99·6 | 100·8 | 100·3 | 100·4 |
| All .. .. .. | 100·4 | 99·6 | 100·7 | 100·6 | 100·3 |
| GLAMORGAN: | | | | | |
| Glamorgan C.C.: | | | | | |
| Eastern Division .. | 98·3 | 97·4 | 98·3 | 99·0 | **98·3** |
| Central Division .. | 98·8 | 100·6 | 100·0 | 100·4 | **100·0** |
| Western Division .. | 99·2 | 98·4 | 99·3 | 97·7 | **98·7** |
| Total .. .. | 98·8 | 98·4 | 99·2 | 99·9 | **99·1** |
| Cardiff .. .. .. | 100·6 | 103·7 | 99·7 | 99·9 | 101·0 |
| Merthyr Tydfil .. | 96·5 | 98·5 | 91·5 | 95·5 | 95·5 |
| Mountain Ash .. | 98·9 | 98·1 | 99·3 | 98·7 | 98·8 |
| Pontypridd .. .. | 99·2 | 99·8 | 100·6 | 100·4 | 100·0 |
| Rhondda .. .. | 97·8 | 97·3 | 98·5 | 97·4 | **97·8** |
| Swansea .. .. | 98·1 | 97·3 | 98·3 | 96·8 | 97·6 |
| GLOUCESTERSHIRE: | | | | | |
| Gloucestershire C.C. .. | 101·6 | 102·0 | 101·7 | 103·1 | 102·1 |
| | 100·7 | 101·0 | 101·0 | 101·8 | 101·1 |
| | 100·6 | 101·3 | 100·9 | 102·1 | 101·2 |
| Cheltenham .. .. | 100·4 | 104·8 | 102·0 | 103·1 | 102·6 |
| Forest of Dean .. | 99·8 | 99·6 | 99·7 | 100·7 | 100·0 |
| | 99·1 | 100·3 | 100·0 | 101·6 | 100·3 |
| Gloucester .. .. | 100·0 | 97·3 | 100·1 | 98·8 | 99·1 |
| HANTS: | | | | | |
| Hampshire: North .. | 100·0 | 99·0 | 100·1 | 99·2 | **99·6** |
| " South .. | 100·0 | 100·6 | 99·9 | 100·0 | **100·1** |
| Total .. .. | 100·0 | 99·9 | 99·9 | 99·6 | **99·9** |
| Gosport .. .. | 102·2 | 105·9 | 101·7 | 105·8 | 103·9 |
| Portsmouth .. .. | 99·2 | 99·2 | 100·1 | 101·3 | 100·0 |
| Southampton .. .. | 100·2 | 100·5 | 100·4 | 101·5 | **100·7** |
| HEREFORDSHIRE: | | | | | |
| Hereford C.C. .. .. | 99·9 | 99·5 | 100·0 | 101·0 | **100·1** |
| Hereford .. .. | 100·4 | 100·1 | 102·0 | 99·7 | 100·6 |
| HERTS: | | | | | |
| Herts C.C.: Urban .. | 101·8 | 102·7 | 102·2 | 103·0 | *102·4* |
| Rural .. .. | 102·0 | 98·8 | 108·3 | 102·0 | *102·8* |
| All .. .. .. | 101·9 | 100·6 | 104·6 | 102·3 | *102·4* |
| HUNTS: | | | | | |
| Hunts C.C. .. .. | 102·6 | 104·6 | 102·3 | 103·9 | **103·4** |

INDEX NUMBERS—*continued.*

| Name of Place. | Boys: | | Girls: | | Average. |
|---|---|---|---|---|---|
| | Height. | Weight. | Height. | Weight. | |
| KENT: | | | | | |
| Kent C.C. .. .. | 98·4 | 98·4 | 98·9 | 97·5 | **98·3** |
| Ashford East .. .. | 99·8 | 100·1 | 99·5 | 97·1 | *99·1* |
| Ashford West .. .. | 99·8 | 100·9 | 100·2 | 103·0 | *101·0* |
| Bridge .. .. .. | 101·8 | 104·4 | 99·6 | 99·5 | *101·3* |
| Bromley .. .. | 101·6 | 104·7 | 101·6 | 103·4 | 102·8 |
| Chatham .. .. | 100·3 | 102·1 | 100·1 | 101·6 | 101·0 |
| Dover .. .. .. | 102·0 | 104·4 | 101·0 | 102·1 | 102·4 |
| Erith .. .. .. | 100·7 | 100·1 | 101·2 | 101·9 | 101·0 |
| Folkestone .. .. | 100·7 | 101·4 | 100·6 | 102·5 | *101·3* |
| Hollingbourn .. .. | 100·5 | 98·1 | 99·6 | 98·0 | *99·1* |
| Margate .. .. | 98·0 | 96·6 | 97·0 | 94·2 | **96·5** |
| Sheerness .. .. | 100·7 | 100·4 | 100·2 | 101·1 | *100·6* |
| LANCASHIRE: | | | | | |
| Ashton-under-Lyne .. | 97·2 | 96·6 | 96·3 | 94·1 | **96·1** |
| Barrow in-Furness .. | 99·5 | 100·8 | 99·7 | 99·8 | 100·0 |
| Blackburn .. .. | 98·0 | 98·8 | 98·9 | 100·6 | **99·1** |
| Bolton .. .. .. | 98·8 | 100·4 | 97·9 | 96·6 | **98·4** |
| Bootle .. .. .. | 98·8 | 99·0 | 99·4 | 101·2 | 99·6 |
| Bury .. .. .. | 98·8 | 101·0 | 98·4 | 100·8 | 99·8 |
| Clitheroe .. .. | 100·3 | 102·1 | 99·5 | 101·5 | **100·8** |
| Darwen .. .. | 99·4 | 98·7 | 98·7 | 96·7 | **98·4** |
| Heywood .. .. | 99·2 | 96·9 | 98·8 | 96·6 | **97·9** |
| Liverpool .. .. | 98·3 | 96·5 | 98·2 | 96·9 | **97·5** |
| Manchester .. .. | 98·7 | 99·3 | 97·4 | 98·6 | 98·5 |
| Middleton .. .. | 98·7 | 95·8 | 98·8 | 97·4 | 97·7 |
| Oldham .. .. | 96·0 | 93·8 | 95·3 | 90·4 | *93·9* |
| Preston .. .. | 99·2 | 97·4 | 98·8 | 96·5 | 98·0 |
| Radcliffe .. .. | 97·9 | 96·4 | 97·6 | 94·0 | *96·5* |
| Rawtenstall .. .. | 99·6 | 99·1 | 98·1 | 97·9 | *98·7* |
| Rochdale .. .. | 99·0 | 96·8 | 99·5 | 97·4 | 98·2 |
| Wigan .. .. .. | 97·6 | 98·8 | 99·3 | 98·6 | 98·6 |
| LEICESTERSHIRE: | | | | | |
| Leicester: | | | | | |
| Special Schools .. | 101·4 | 102·6 | 101·4 | 101·9 | **101·8** |
| Medium Schools .. | 99·9 | 102·2 | 101·0 | 101·2 | **101·1** |
| Very Poor Schools .. | 98·5 | 97·7 | 99·4 | 98·8 | **98·6** |
| All .. .. .. | 99·5 | 99·5 | 100·5 | 100·0 | **99·9** |
| LINCOLNSHIRE: | | | | | |
| Grimsby .. .. | 101·0 | 103·3 | 102·5 | 104·4 | *102·8* |
| Kesteven C.C. .. | 101·1 | 103·4 | 103·0 | 103·1 | 102·7 |
| LONDON: | | | | | |
| London: | | | | | |
| Series A.: Poor Schools ('06) .. | 99·7 | 100·1 | 100·1 | 100·6 | **100·1** |
| Series B.: Suburban Schools ('06) .. | 101·5 | 102·9 | 101·7 | 103·6 | **102·4** |
| Series C. .. .. | 99·0 | 97·2 | 100·7 | 100·7 | **99·4** |

INDEX NUMBERS—*continued.*

| Name of Place. | Boys: Height. | Boys: Weight. | Girls: Height. | Girls: Weight. | Average. |
|---|---|---|---|---|---|
| LONDON—*continued.* | | | | | |
| Sirdar Road School ('08) .. .. | 97·9 | 95·3 | 98·1 | 97·1 | **97·1** |
| Entrants and Leavers ('09) .. .. | 100·4 | 98·2 | 100·0 | 98·8 | 99·4 |
| Schools fully Examined ('09) .. | 99·6 | 97·6 | 99·9 | 98·3 | **98·9** |
| All London .. .. | 100·0 | 98·6 | 100·2 | 99·6 | **99·6** |
| MERIONETH: | | | | | |
| Merioneth C.C.: | | | | | |
| Urban .. .. | 100·3 | 99·6 | 99·5 | 99·4 | **99·7** |
| Rural .. .. | 101·5 | 105·7 | 101·0 | 103·1 | **102·8** |
| All .. .. .. | 100·9 | 102·6 | 100·3 | 100·9 | **101·2** |
| Bala .. .. .. | 101·6 | 105·0 | 101·0 | 104·4 | 103·0 |
| Barmouth .. .. | 101·1 | 101·8 | 100·5 | 99·9 | 100·8 |
| Corwen .. .. | 100·6 | 102·2 | 99·6 | 100·7 | 100·8 |
| Dolgelley: | | | | | |
| No. I.: Sub-District | 101·8 | 105·2 | 101·5 | 103·2 | 102·9 |
| No. II.: Sub-District | 96·4 | 105·5 | 97·0 | 105·0 | *101·0* |
| Festiniog: | | | | | |
| Urban .. .. | 100·1 | 100·2 | 99·8 | 100·6 | 100·2 |
| Rural .. .. | 101·3 | 104·0 | 100·3 | 102·7 | 102·1 |
| Towyn .. .. .. | 101·2 | 102·4 | 100·2 | 101·7 | 101·4 |
| MIDDLESEX: | | | | | |
| Middlesex C.C. .. | 101·0 | 101·5 | 101·3 | 101·0 | 101·2 |
| Edmonton .. .. | 98·1 | 96·7 | 98·7 | 97·5 | **97·8** |
| Enfield .. .. | 101·5 | 103·0 | 102·0 | 103·1 | **102·4** |
| Hornsey .. .. | 101·9 | 101·9 | 100·6 | 101·9 | 101·6 |
| Walthamstow .. | 99·6 | 101·7 | 98·5 | 99·2 | 99·8 |
| Willesden .. .. | 100·8 | 100·1 | 101·1 | 99·3 | **100·3** |
| Wood Green .. .. | 100·5 | 104·2 | 100·8 | 104·4 | **102·5** |
| MONMOUTHSHIRE: | | | | | |
| Monmouthshire C.C. .. | 97·8 | 96·9 | 98·4 | 97·7 | **97·7** |
| Abertillery .. .. | 97·7 | 96·1 | 98·1 | 97·3 | **97·3** |
| Newport .. .. | 98·8 | 100·8 | 98·2 | 101·9 | 99·9 |
| | 98·9 | 97·7 | 99·3 | 97·7 | *98·4* |
| NORFOLK: | | | | | |
| Norfolk: Eastern .. | 100·9 | 102·0 | 101·6 | 102·9 | **101·9** |
| " Western .. | 101·1 | 104·2 | 101·1 | 104·6 | **102·8** |
| Total .. .. | 100·9 | 102·8 | 101·4 | 103·8 | **102·2** |
| NORTHAMPTONSHIRE: | | | | | |
| Northamptonshire C.C.: | | | | | |
| Urban .. .. | 101·2 | 102·2 | 101·4 | 99·3 | 101·0 |
| Rural .. .. | 101·6 | 104·5 | 101·4 | 101·4 | 102·2 |
| All .. .. .. | 101·3 | 103·0 | 101·6 | 102·4 | 102·1 |

INDEX NUMBERS—*continued.*

| Name of Place. | Boys: Height. | Boys: Weight. | Girls: Height. | Girls: Weight. | Average. |
|---|---|---|---|---|---|
| NORTHAMPTONSHIRE—*cont.* | | | | | |
| Norhamptonshire C.C.—*cont.* | | | | | |
| Urban Districts. | | | | | |
| Brackley .. .. | 102·7 | 108·6 | 103·5 | 105·1 | *105·0* |
| Daventry .. .. | 100·4 | 102·1 | 100·7 | 98·5 | *100·4* |
| Desborough .. .. | 101·6 | 103·6 | 99·7 | 96·9 | *100·5* |
| Finedon .. .. | 100·8 | 102·5 | 101·0 | 103·6 | *102·0* |
| Higham Ferrers .. | 101·2 | 103·6 | 101·8 | 101·8 | *102·1* |
| Irthlingboro' .. | 100·4 | 102·1 | 100·1 | 101·6 | *101·1* |
| Oundle .. .. | 102·5 | 102·9 | 103·4 | 104·6 | *103·4* |
| Raunds .. .. | 101·0 | 100·8 | 100·4 | 97·6 | *100·0* |
| Rothwell .. .. | 100·9 | 102·5 | 100·6 | 97·6 | *100·4* |
| Rushden .. .. | 101·5 | 102·5 | 101·8 | 98·0 | *101·0* |
| Wellingborough .. | 101·8 | 102·2 | 101·2 | 102·0 | *101·8* |
| Rural Districts. | | | | | |
| Brackley .. .. | 102·1 | 107·5 | 104·5 | 108·1 | *105·6* |
| Brixworth .. .. | 101·6 | 104·3 | 101·8 | 102·9 | *102·7* |
| Crick .. .. .. | 102·7 | 108·6 | 102·3 | 98·3 | *103·0* |
| Daventry .. .. | 102·1 | 103·9 | 102·3 | 102·9 | *102·8* |
| Easton-on-the-Hill .. | 100·9 | 104·2 | 101·3 | 104·5 | *102·7* |
| Gretton .. .. | — | — | 104·2 | 112·1 | *108·2* |
| Hardingstone .. | 101·6 | 104·4 | 101·2 | 100·6 | *102·0* |
| Kettering .. .. | 100·9 | 102·8 | 100·9 | 100·7 | *101·3* |
| Middleton Cheney .. | 99·3 | 101·8 | 101·0 | 100·6 | *100·7* |
| Northampton .. | 101·7 | 103·5 | 101·0 | 102·0 | *102·1* |
| Oundle .. .. | 100·0 | 101·3 | 102·4 | 100·7 | *101·1* |
| Oxendon .. .. | 102·7 | 105·4 | 102·3 | 101·1 | *102·9* |
| Pottersbury .. .. | 101·2 | 105·1 | 102·3 | 104·1 | *103·2* |
| Thrapston .. .. | 101·5 | 102·3 | 101·3 | 100·9 | *101·5* |
| Towchester .. .. | 102·4 | 105·8 | 102·1 | 103·7 | *103·5* |
| Wellingborough .. | 100·7 | 102·7 | 101·6 | 100·6 | *101·4* |
| Kettering .. .. | 102·0 | 105·2 | 99·5 | 98·3 | *101·3* |
| | 102·3 | 103·9 | 102·4 | 104·4 | *103·3* |
| | 99·6 | 102·1 | 102·6 | 102·4 | *101·7* |
| NORTHUMBERLAND: | | | | | |
| Berwick .. .. | 100·0 | 100·0 | 99·9 | 100·9 | **100·2** |
| Newcastle-on-Tyne: | | | | | |
| Poorer Schools ('09) | 96·1 | 92·5 | 95·0 | 92·2 | 94·0 |
| Poorer Schools ('10) | 96·6 | 93·3 | 97·4 | 94·9 | 95·6 |
| Better Schools ('09) | 100·2 | 99·5 | 100·0 | 100·4 | 100·0 |
| Better Schools ('10) | 99·8 | 97·9 | 99·6 | 99·1 | 99·1 |
| All .. .. .. | 98·6 | 95·3 | 98·1 | 96·1 | **97·0** |
| Tynemouth .. .. | 98·5 | 98·7 | 98·0 | 98·4 | **98·4** |
| NOTTINGHAMSHIRE: | | | | | |
| Nottinghamshire C.C.: | | | | | |
| Urban ('10) .. .. | 98·8 | 100·1 | 99·3 | 99·3 | **99·4** |
| Rural ('10) .. .. | 101·5 | 105·1 | 101·4 | 104·3 | **103·1** |
| Total ('09–'10) .. | 100·0 | 100·0 | 99·9 | 100·3 | **100·1** |

INDEX NUMBERS—*continued.*

| Name of Place. | Boys: | | Girls: | | Average. |
|---|---|---|---|---|---|
| | Height. | Weight. | Height. | Weight. | |
| NOTTINGHAMSHIRE—*cont.* | | | | | |
| Mansfield .. .. | 98·7 | 99·3 | 99·2 | 98·2 | **98·9** |
| Nottingham: | | | | | |
| Better Class Schools ('10) .. .. | 101·7 | 101·7 | 101·4 | 102·8 | **101·9** |
| Medium Class ('10).. | 100·2 | 100·8 | 100·2 | 99·8 | **100·3** |
| Poor Class ('10) .. | 97·3 | 96·9 | 98·2 | 97·9 | **97·6** |
| Total ('09–'10) .. | 99·6 | 99·5 | 99·4 | 99·2 | **99·4** |
| OXFORDSHIRE: | | | | | |
| Oxfordshire C.C. .. | 101·5 | 104·2 | 101·9 | 104·7 | **103·1** |
| PEMBROKE: | | | | | |
| Pembroke C.C. .. | 100·6 | 103·6 | 98·1 | 105·0 | 101·8 |
| RADNORSHIRE | | | | | |
| Radnorshire C.C. .. | 98·5 | 97·3 | 98·5 | 95·1 | **97·4** |
| RUTLAND: | | | | | |
| Rutland C.C. .. .. | 98·7 | 101·8 | 99·6 | 102·1 | 100·6 |
| SHROPSHIRE: | | | | | |
| Shrewsbury .. .. | 99·7 | 98·2 | 101·0 | 97·3 | 99·1 |
| SOMERSET: | | | | | |
| Somerset C.C.: | | | | | |
| Urban ('08) .. .. | 100·6 | 99·6 | 100·6 | 99·3 | 100·0 |
| Urban ('09) .. .. | 100·5 | 99·7 | 100·5 | 101·0 | 100·4 |
| Urban ('10) .. .. | 100·5 | 99·7 | 100·6 | 101·0 | 100·5 |
| Rural ('08) .. .. | 101·3 | 101·9 | 101·7 | 102·3 | 101·8 |
| Rural ('09) .. .. | 100·9 | 100·8 | 101·1 | 101·4 | 101·1 |
| Rural ('10) .. .. | 100·8 | 100·8 | 101·3 | 101·8 | 101·2 |
| All ('08–'09) .. | 101·1 | 101·0 | 101·5 | 101·3 | **101·2** |
| All ('10) .. .. | 100·7 | 100·4 | 101·0 | 101·4 | **100·9** |
| Bath .. .. .. | 100·3 | 106·8 | 100·3 | 104·5 | 103·0 |
| Exeter .. .. .. | 99·9 | 99·6 | 100·1 | 98·9 | 99·6 |
| Yeovil .. .. .. | 98·9 | 98·0 | 98·7 | 98·2 | **98·5** |
| STAFFORDSHIRE: | | | | | |
| Staffordshire C.C.: | | | | | |
| Rural .. .. | 102·8 | 105·5 | 103·1 | 106·2 | 104·4 |
| Urban .. .. | 101·1 | 102·2 | 101·7 | 103·4 | 102·1 |
| All .. .. .. | 101·7 | 103·4 | 102·0 | 104·4 | 102·9 |
| Burton-on-Trent .. | 100·1 | 100·8 | 100·8 | 99·6 | 100·3 |
| Coseley .. .. | 97·0 | 96·9 | 97·8 | 96·6 | 97·1 |
| Fenton .. .. | 99·5 | 95·9 | 99·7 | 95·4 | 97·6 |
| Handsworth .. .. | 100·4 | 98·5 | 100·9 | 98·7 | **99·6** |
| Hanley .. .. | 97·5 | 95·9 | 96·1 | 94·4 | *96·0* |
| Smethwick .. .. | 98·2 | 95·8 | 98·3 | 96·8 | **97·3** |
| Stoke-on-Trent .. | 101·0 | 100·0 | 98·2 | 94·5 | 98·4 |
| Walsall .. .. | 101·1 | 101·9 | 100·4 | 98·4 | 100·5 |
| West Bromwich .. | 99·1 | 94·0 | 97·5 | 90·7 | *95·3* |
| Wolverhampton .. | 97·7 | 98·0 | 97·6 | 98·4 | 97·9 |
| SUFFOLK: | | | | | |
| East Suffolk .. .. | 101·0 | 100·1 | 101·6 | 101·6 | **101·1** |
| West Suffolk .. .. | 100·8 | 101·2 | 101·3 | 101·6 | *101·2* |
| | 99·9 | 100·4 | 100·1 | 100·2 | *100·2* |
| Ipswich .. .. | 98·2 | 94·3 | 98·5 | 94·7 | **96·4** |

INDEX NUMBERS—*continued.*

| Name of Place. | Boys: | | Girls: | | Average. |
|---|---|---|---|---|---|
| | Height. | Weight. | Height. | Weight. | |
| SURREY: | | | | | |
| Croydon .. .. | 100·9 | 100·8 | 99·7 | 101·8 | **100·8** |
| Guildford .. .. | 100·4 | 100·3 | 100·5 | 103·8 | *101·3* |
| Reigate .. .. | 100·8 | 103·7 | 102·0 | 103·9 | **102·6** |
| Richmond .. .. | 99·5 | 100·4 | 99·7 | 100·1 | 99·9 |
| SUSSEX: | | | | | |
| East Sussex: | | | | | |
| Urban .. .. | 100·4 | 100·2 | 100·6 | 101·7 | **100·7** |
| Rural .. .. | 101·0 | 102·7 | 102·6 | 104·2 | **102·6** |
| All .. .. .. | 100·8 | 101·7 | 101·5 | 103·4 | **101·9** |
| West Sussex .. .. | 101·1 | 102·4 | 101·4 | 102·9 | 102·0 |
| Brighton: | | | | | |
| Better Schools .. | 101·5 | 98·8 | 102·7 | 102·5 | 101·4 |
| Poorer Schools .. | 98·3 | 93·4 | 98·5 | 96·6 | 96·7 |
| All .. .. .. | 99·7 | 95·4 | 101·5 | 99·4 | **99·0** |
| Eastbourne .. .. | 102·1 | 101·6 | 103·1 | 103·9 | *102·7* |
| | 101·6 | 98·5 | 101·1 | 101·2 | *100·6* |
| Hastings .. .. | 99·8 | 98·8 | 99·7 | 98·8 | **99·3** |
| WARWICKSHIRE: | | | | | |
| Warwickshire C.C.: | | | | | |
| Northern Division .. | 99·6 | 100·0 | 100·3 | 99·9 | *100·0* |
| Central Division .. | 99·1 | 100·5 | 99·9 | 100·7 | *100·1* |
| Southern Division .. | 99·5 | 99·0 | 100·6 | 100·4 | *99·9* |
| Total .. .. | 99·4 | 99·9 | 100·3 | 99·8 | *99·9* |
| Coventry .. .. | 99·4 | 97·5 | 99·7 | 99·6 | 99·0 |
| WESTMORELAND: | | | | | |
| Westmoreland C.C. . | 102·3 | 105·6 | 102·9 | 105·8 | **104·2** |
| Kendal .. .. | 99·5 | 101·6 | 100·0 | 101·0 | **100·5** |
| WILTSHIRE: | | | | | |
| Wiltshire C.C.: | | | | | |
| Rural ('10) .. .. | 100·7 | 102·5 | 101·4 | 103·5 | **102·0** |
| Urban ('10) .. | 99·1 | 100·8 | 101·1 | 102·2 | **100·8** |
| All ('09–'10) .. | 100·6 | 101·9 | 101·3 | 103·5 | **101·8** |
| WORCESTERSHIRE: | | | | | |
| Worcestershire C.C. .. | 99·2 | 101·3 | 100·8 | 103·9 | **101·3** |
| Education Districts. | | | | | |
| Bromsgrove .. | 98·1 | 96·4 | 99·2 | 98·1 | 98·0 |
| Droitwich .. .. | 98·2 | 96·7 | 99·0 | 103·2 | 99·3 |
| Evesham .. .. | 100·3 | 100·0 | 99·6 | 94·6 | *98·6* |
| Halesowen .. .. | 96·6 | 97·9 | 98·1 | 97·7 | 97·6 |
| Kidderminster .. | 99·7 | 101·1 | 99·9 | 101·3 | 100·5 |
| Malvern .. .. | 99·6 | 97·6 | 99·1 | 99·0 | 98·8 |
| Martley .. .. | 100·0 | 99·5 | 101·0 | 101·1 | 100·4 |
| Pershore .. .. | 99·1 | 98·7 | 99·8 | 100·5 | 99·5 |
| Redditch .. .. | 98·1 | 95·3 | 97·3 | 98·6 | 97·3 |
| Rock.. .. .. | 97·7 | 100·0 | 99·6 | 101·1 | *99·6* |
| Shipston-on-Stour .. | 99·8 | 102·2 | 100·7 | 102·1 | *101·2* |
| Stourbridge .. | 98·0 | 97·9 | 99·8 | 98·1 | 98·5 |
| Tenbury .. .. | 98·9 | 97·9 | 98·8 | 99·4 | *98·8* |
| Upton-on-Severn .. | 99·5 | 100·5 | 99·2 | 101·4 | *100·2* |
| Yardley .. .. | 98·1 | 95·7 | 99·6 | 95·8 | 97·3 |
| Worcester .. .. | 99·5 | 97·0 | 99·4 | 97·7 | **98·4** |

INDEX NUMBERS—*continued.*

| Name of Place. | Boys: Height. | Boys: Weight. | Girls: Height. | Girls: Weight. | Average. |
|---|---|---|---|---|---|
| YORKSHIRE [E. RIDING]: | | | | | |
| Bridlington .. .. | 102·4 | 101·9 | 100·6 | 104·3 | *102·3* |
| | 102·3 | 106·0 | 100·2 | 105·1 | *103·4* |
| Hull .. .. .. | 99·4 | 100·0 | 99·8 | 100·7 | **100·0** |
| YORKSHIRE [N. RIDING]: | | | | | |
| Middlesbrough .. | 98·9 | 99·1 | 98·9 | 98·5 | 98·9 |
| | 99·4 | 98·8 | 98·9 | 97·7 | 98·7 |
| Scarborough .. .. | 99·6 | 98·7 | 99·5 | 97·8 | **98·9** |
| YORKSHIRE [W. RIDING]: | | | | | |
| West Riding C.C.: | | | | | |
| Education Districts. | | | | | |
| Barnsley .. .. | 98·0 | 99·4 | 98·8 | 97·8 | **98·5** |
| Castleford .. .. | 99·8 | 99·7 | 99·0 | 98·4 | **99·2** |
| Doncaster .. .. | 100·4 | 102·5 | 100·4 | 103·9 | **101·8** |
| Harrogate .. .. | 100·2 | 102·3 | 101·2 | 103·0 | 101·7 |
| Huddersfield .. | 100·5 | 103·7 | 100·3 | 98·6 | 100·8 |
| Shipley .. .. | 98·9 | 100·9 | 99·3 | 100·9 | *100·0* |
| Skipton .. .. | 102·4 | 104·7 | 101·1 | 102·2 | 102·6 |
| Sowerby Bridge .. | 100·3 | 100·8 | 98·9 | 100·0 | 100·0 |
| Swinton .. .. | 98·9 | 98·9 | 99·0 | 98·0 | **98·7** |
| Wakefield .. .. | 99·6 | 100·0 | 99·0 | 97·4 | 99·0 |
| West Riding [All] .. | 100·1 | 100·4 | 99·2 | 98·6 | **99·6** |
| Batley .. .. .. | 97·0 | 92·2 | 96·2 | 93·2 | **94·7** |
| Bradford: | | | | | |
| Ordinary ('06) .. | 99·9 | 99·2 | 99·4 | 100·2 | **99·7** |
| Poor ('06) .. .. | 96·9 | 96·5 | 96·9 | 94·9 | **96·3** |
| Total ('06, '07, '08, '09, '10) .. .. | 98·5 | 97·6 | 98·4 | 97·3 | **98·0** |
| Brighouse .. .. | 99·4 | 98·4 | 98·0 | 94·9 | **97·7** |
| Dewsbury .. .. | 97·9 | 97·5 | 97·2 | 95·8 | *97·1* |
| Huddersfield .. .. | 98·1 | 96·8 | 97·2 | 95·2 | **96·8** |
| Keighley .. .. | 97·8 | 96·8 | 98·1 | 95·3 | **97·0** |
| Leeds: | | | | | |
| Suburban .. .. | 100·4 | 101·1 | 100·4 | 101·4 | *100·8* |
| | 99·6 | 99·3 | 99·3 | 98·3 | *99·1* |
| Better .. .. | 101·1 | 100·6 | 100·4 | 99·6 | *100·4* |
| | 100·2 | 99·5 | 100·4 | 99·3 | *99·9* |
| Ordinary .. .. | 98·1 | 96·4 | 97·7 | 96·5 | *97·2* |
| | 97·5 | 95·3 | 97·7 | 95·3 | *96·5* |
| Poor .. .. | 96·4 | 95·8 | 97·0 | 95·6 | *96·2* |
| | 96·3 | 94·2 | 96·2 | 93·1 | *95·0* |
| Jewish .. .. | 99·4 | 102·6 | 98·9 | 103·7 | *101·2* |
| | 96·3 | 97·0 | 97·1 | 97·6 | *97·0* |
| All .. .. .. | 98·6 | 97·3 | 98·2 | 96·1 | **97·6** |
| Ossett .. .. .. | 95·8 | 92·5 | 96·4 | 91·7 | 94·1 |
| Sheffield .. .. | 98·2 | 97·6 | 98·5 | 96·4 | **97·7** |
| Sheffield, Mentally Deficients .. .. | 95·7 | 92·1 | 93·8 | 90·6 | *93·1* |
| Shipley .. .. | 99·2 | 99·2 | 98·6 | 98·2 | **98·8** |
| Wakefield .. .. | 98·6 | 97·8 | 98·1 | 95·4 | **97·5** |

## APPENDIX B.

Below will be found examples of the distribution of the *local means* of the heights and weights of boys and girls. The numbers of children at each height (or weight) do not signify that so many children were individually of that height (or weight), but that these children were on the average that height (or weight). The School Medical Officers' reports do not give statistics for each individual, but only for *groups* of individuals.

| Boys' Heights. Age 7. | | Boys' Weights. Age 7. | | Boys' Weights. Age. 7 | |
|---|---|---|---|---|---|
| Ins. | Number. | Lbs. | Number. | Lbs. | Number. |
| 42·0 | 21 | 41·0 | 7 | 48·0 | 1,183 |
| ·5 | 270 | ·5 | 267 | ·5 | 1,245 |
| 43·0 | 925 | 42·0 | 311 | 49·0 | 1,176 |
| ·5 | 3,956 | ·5 | 6 | ·5 | 535 |
| 44·0 | 3,761 | 43·0 | 166 | 50·0 | 893 |
| ·5 | 5,978 | ·5 | 1,488 | ·5 | — |
| 45·0 | 17,555 | 44·0 | 3,210 | 51·0 | 211 |
| ·5 | 12,457 | ·5 | 2,977 | ·5 | 1 |
| 46·0 | 1,227 | 45·0 | 2,243 | 52·0 | — |
| ·5 | 588 | ·5 | 6,586 | ·5 | — |
| 47·0 | 611 | 46·0 | 4,964 | 53·0 | 15 |
| ·5 | 41 | ·5 | 5,595 | | |
| 48·0 | 1 | 47·0 | 9,439 | | |
| | | ·5 | 3,651 | | |
| Total | 47,391 | | | Total | 46,439 |

| Girls' Heights. Age 11. | | Girls' Weights. Age 11. | | Girls' Weights. Age 11. | |
|---|---|---|---|---|---|
| Ins. | Number. | Lbs. | Number. | Lbs. | Number. |
| 45·0 | 20 | 53·0 | 1 | 66·0 | 469 |
| 48·5 | 6 | 54·5 | 6 | ·5 | 222 |
| 50·0 | 200 | 56·0 | 3 | 67·0 | 1,438 |
| ·5 | 164 | 57·5 | 154 | ·5 | 299 |
| 51·0 | 434 | 58·0 | 6 | 68·0 | 526 |
| ·5 | 458 | ·5 | 9 | ·5 | 388 |
| 52·0 | 1,005 | 59·0 | 27 | 69·0 | 269 |
| ·5 | 3,386 | ·5 | 5 | ·5 | 176 |
| 53·0 | 1,287 | 60·0 | 30 | 70·0 | 46 |
| ·5 | 1,617 | ·5 | 212 | ·5 | 20 |
| 54·0 | 1,131 | 61·0 | 49 | 71·0 | 227 |
| ·5 | 723 | ·5 | 8 | ·5 | 14 |
| 55·0 | 128 | 62·0 | 253 | 72·0 | 25 |
| ·5 | 97 | ·5 | 468 | ·5 | 46 |
| 58·0 | 52 | 63·0 | 385 | 73·0 | 44 |
| 59·0 | 1 | ·5 | 1,276 | 75·0 | 3 |
| | | 64·0 | 606 | 78·0 | 4 |
| | | ·5 | 1,310 | 86·0 | 1 |
| | | 65·0 | 769 | | |
| | | ·5 | 871 | | |
| Total | 10,709 | | | Total | 10,605 |

## APPENDIX C.

This Appendix contains the table drawn up by the Anthropometric Committee of the British Association to illustrate the classification they adopted, together with their statistics and those obtained in some other investigations.

TABLE

CLASSIFICATION OF THE BRITISH POPULATION ACCORDING TO MEDIA, OR THE CONDITIONS OF LIFE.
BRITISH ASSOCIATION REPORT, 1880 (p. 126).

| Social Condition.*—Non-Labouring Classes. | | | Labouring Classes. | | | |
|---|---|---|---|---|---|---|
| Nurture.†—Very Good. | | Good. | Imperfect. | | Bad. | Selected Classes. |
| Professional Classes‡ (Upper and Upper Middle Classes) 4·46 per cent. | | Commercial Class (Lower Middle Classes) 10·30 per cent. | Labourers 47·46 per cent. | Artisans 26·82 per cent. | Industrial Classes (Sedentary Trades) 10·90 per cent. | |
| Out-door Country.§ | In-door Towns. | In-door Towns. | Out-door Country. | In-door Towns. | In-door Towns. | |
| Class I.<br>Country-gentlemen<br>Gentlemen-farmers<br>Officers of Army and Navy<br>Auxiliary Forces<br>Clergymen<br>Lawyers<br>Doctors<br>Civil Engineers<br>Architects<br>Dentists<br>—<br>—<br>—<br>—<br>—<br>—<br>—<br>— | <br>—<br>—<br>—<br><br><br><br><br><br><br><br>Civil Servants<br>Authors<br>Artists<br>Teachers<br>Musicians<br>Actors<br>Bankers<br>Merchants (Wholesale) | Class II.<br>Teachers in Elementary Schools<br>Clerks<br>Shopkeepers<br>Shopmen<br>Dealers in:<br>Drugs<br>Books<br>Wool<br>Silk<br>Cotton<br>Foods<br>Drinks<br>Furniture<br>Metals<br>Glass<br>Earthenware<br>Fuel, etc. | Class III.<br>Labourers and Workers on<br>Agriculture<br>Gardens<br>Roads<br>Railways<br>Quarries<br>Navvies<br>Porters<br>Guards<br>Woodmen<br>Brickmakers<br>Labourers, etc. on Water:<br>Sailors<br>Fishermen<br>Watermen<br>Labourers, etc. in Mines:<br>Coal<br>Minerals | Class IV.<br>Workers in:<br>Wood<br>Metal<br>Stone<br>Leather<br>Paper, etc.<br>Engravers<br>Photographers<br>Printers, etc. | Class V.<br>Factory Operatives<br>Tailors<br>Shoemakers, etc. | Class VI.<br>Policemen<br>Fire Brigade<br>Soldiers<br>Recruits<br>Messengers ?<br>Industrial Schools<br>Criminals<br>Idiots<br>Lunatics |

* Social condition (influences of leisure, mental and manual labour).
† Nurture (influences of food, clothing, nursing, domestic surroundings, etc.).
‡ Occupation (influences of external physical conditions, exercise, etc.). Percentage of male population, including male children (Census of 1871).
§ Climatic and sanitary surroundings.

## TABLE I

AVERAGE STATURE (WITHOUT SHOES) FOR DIFFERENT CLASSES OF THE POPULATION OF GREAT BRITAIN.

(British Association Report, 1883, Tables XVI. and XVII.)

| Age. | General Population. All Classes. Town and Country. | | Class I. Professional Classes. Town and Country. | | Class II. Commercial Classes. Towns. | | Class III. Labouring Classes. Country. | | Class IV. Artisans. Towns. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | No. obs. | Av. Hght. Ins. | No. obs. | Av. Hght. Ins. | No. obs. | Av. Hght. Ins. | No. obs. | Av. Hght. Ins. | No. obs. | Av. Hght. Ins. |
| | | | | | MALES. | | | | | |
| 3 | 33 | 36·82 | — | — | — | — | 22 | 37·41 | 11 | 36·23 |
| 4 | 107 | 38·46 | — | — | — | — | 19 | 39·30 | 88 | 37·63 |
| 5 | 201 | 41·03 | — | — | — | — | 34 | 42·35 | 167 | 39·72 |
| 6 | 266 | 44·00 | — | — | 1 | 45·50 | 34 | 44·59 | 231 | 41·90 |
| 7 | 307 | 45·97 | — | — | 4 | 47·50 | 39 | 45·81 | 264 | 44·60 |
| 8 | 1,524 | 47·05 | — | — | 61 | 47·60 | 324 | 47·09 | 1,139 | 46·46 |
| 9 | 2,278 | 49·70 | 22 | 50·80 | 211 | 50·03 | 485 | 49·11 | 1,560 | 48·88 |
| 10 | 1,551 | 51·84 | 101 | 53·69 | 331 | 52·04 | 783 | 50·93 | 336 | 50·72 |
| 11 | 1,766 | 53·50 | 242 | 55·23 | 687 | 53·76 | 597 | 52·32 | 240 | 52·68 |
| 12 | 1,981 | 54·99 | 490 | 57·29 | 902 | 55·29 | 395 | 53·67 | 194 | 53·72 |
| 13 | 2,743 | 56·91 | 869 | 59·08 | 857 | 57·43 | 403 | 55·31 | 614 | 55·81 |
| 14 | 3,428 | 59·33 | 966 | 61·29 | 800 | 59·47 | 9 | 57·94 | 1,653 | 58·61 |
| 15 | 3,498 | 62·24 | 974 | 63·61 | 544 | 62·19 | 515 | 61·82 | 1,465 | 61·36 |
| Total | 19,683 | — | 3,664 | — | 4,398 | — | 3,659 | — | 7,962 | — |
| | | | | | FEMALES. | | | | | |
| 3 | 43 | 36·23 | — | — | 11 | 37·68 | 8 | 36·78 | 24 | 35·33 |
| 4 | 99 | 38·26 | — | — | 12 | 38·50 | 19 | 38·97 | 68 | 37·30 |
| 5 | 157 | 40·55 | — | — | 10 | 40·00 | 43 | 41·87 | 104 | 39·77 |
| 6 | 189 | 42·88 | — | — | 14 | 42·50 | 44 | 43·43 | 131 | 41·84 |
| 7 | 173 | 44·45 | — | — | 30 | 44·43 | 47 | 45·35 | 96 | 43·56 |
| 8 | 432 | 46·60 | — | — | 18 | 47·16 | 119 | 47·10 | 295 | 45·55 |
| 9 | 499 | 48·73 | — | — | 42 | 49·90 | 175 | 48·93 | 282 | 47·36 |
| 10 | 480 | 51·05 | 11 | 53·41 | 52 | 51·44 | 149 | 50·40 | 268 | 48·96 |
| 11 | 441 | 53·10 | 22 | 55·04 | 87 | 53·33 | 115 | 52·48 | 217 | 51·54 |
| 12 | 225 | 55·66 | 23 | 57·41 | 87 | 55·68 | 22 | 55·59 | 93 | 53·98 |
| 13 | 206 | 57·77 | 68 | 59·03 | 66 | 58·47 | 14 | 57·36 | 58 | 56·22 |
| 14 | 240 | 59·80 | 79 | 60·79 | 86 | 60·62 | 12 | 59·16 | 63 | 58·56 |
| 15 | 201 | 60·93 | 70 | 62·11 | 98 | 61·28 | — | — | 33 | 59·41 |
| Total | 3,385 | — | 273 | — | 613 | — | 767 | — | 1,732 | — |

## TABLE I. (*b*).

SHOWING AVERAGE WEIGHT (INCLUDING CLOTHES) OF DIFFERENT CLASSES OF THE POPULATION.

(British Association Report, 1883, Tables XVIII. and XIX.)

| Age. | General Population, All Classes. Town and Country. | | Class I. Professional Classes. Town and Country. | | Class II. Commercial Classes. Towns. | | Class III. Labouring Classes. Country. | | Class IV. Artisans. Towns. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | No. obs. | Av. Wght. lbs. | No. obs. | Av. Wght. lbs. | No. obs. | Av. Wght. lbs. | No. obs. | Av. Wght. lbs. | No. obs. | Av. Wght. lbs. |
| | | | | | MALES. | | | | | |
| 3 | 41 | 34·0 | — | — | — | — | 11 | 33·1 | 30 | 35·0 |
| 4 | 102 | 37·3 | — | — | 1 | 37·5 | 15 | 35·8 | 86 | 38·6 |
| 5 | 193 | 39·9 | — | — | — | — | 29 | 38·9 | 164 | 40·9 |
| 6 | 224 | 44·4 | — | — | — | — | 35 | 44·2 | 189 | 44·6 |
| 7 | 246 | 49·7 | — | — | 4 | 51·3 | 37 | 47·2 | 205 | 50·7 |
| 8 | 820 | 54·9 | — | — | 63 | 55·5 | 286 | 54·8 | 471 | 54·3 |
| 9 | 1,425 | 60·4 | — | — | 211 | 62·3 | 415 | 60·5 | 799 | 58·3 |
| 10 | 1,464 | 67·5 | 92 | 74·0 | 370 | 65·2 | 721 | 67·0 | 281 | 64·0 |
| 11 | 1,599 | 72·6 | 185 | 78·7 | 686 | 68·0 | 553 | 72·2 | 175 | 69·0 |
| 12 | 1,786 | 76·7 | 369 | 84·9 | 905 | 73·2 | 366 | 75·9 | 146 | 73·0 |
| 13 | 2,443 | 82·6 | 621 | 91·6 | 854 | 80·1 | 328 | 79·7 | 640 | 79·0 |
| 14 | 2,952 | 92·0 | 748 | 102·2 | 799 | 89·5 | 9 | 89·2 | 1,396 | 87·3 |
| 15 | 3,118 | 102·7 | 652 | 114·3 | 344 | 99·4 | 676 | 100·6 | 1,446 | 96·4 |
| Total | 16,413 | — | 2,667 | — | 4,237 | — | 3,481 | — | 6,028 | — |
| | | | | | FEMALES. | | | | | |
| 3 | 30 | 31·6 | — | — | 11 | 30·9 | 8 | 33·0 | 22 | 30·8 |
| 4 | 97 | 36·1 | — | — | 12 | 37·9 | 17 | 34·6 | 68 | 35·8 |
| 5 | 160 | 39·2 | — | — | 18 | 38·8 | 44 | 38·4 | 108 | 40·3 |
| 6 | 178 | 41·7 | — | — | 13 | 41·4 | 43 | 40·5 | 122 | 43·1 |
| 7 | 148 | 47·5 | 7 | 51·8 | 31 | 45·4 | 42 | 46·8 | 99 | 46·2 |
| 8 | 330 | 52·1 | 6 | 52·5 | 12 | 52·5 | 140 | 51·9 | 172 | 51·8 |
| 9 | 535 | 55·5 | 17 | 55·4 | 23 | 55·0 | 209 | 56·5 | 286 | 55·2 |
| 10 | 495 | 62·0 | 37 | 62·9 | 23 | 62·9 | 171 | 61·8 | 264 | 60·5 |
| 11 | 456 | 68·1 | 61 | 69·9 | 41 | 68·5 | 130 | 67·1 | 224 | 66·8 |
| 12 | 419 | 76·4 | 55 | 79·7 | 55 | 77·3 | 126 | 75·7 | 183 | 74·9 |
| 13 | 209 | 87·2 | 63 | 89·8 | 60 | 88·2 | 21 | 84·0 | 65 | 84·9 |
| 14 | 229 | 96·7 | 75 | 98·8 | 81 | 96·3 | 12 | 94·0 | 61 | 97·7 |
| 15 | 187 | 106·3 | 60 | 107·3 | 91 | 104·1 | — | — | 36 | 107·6 |
| Total | 3,473 | — | 381 | — | 471 | — | 963 | — | 1,710 | — |

## TABLE II. (a).

PUBLIC SCHOOLS OF GLASGOW.*

BOYS' HEIGHTS (IN INCHES) AND WEIGHTS (IN LBS )

School Group

Total numbers examined and average Heights and Weights of A, B, C & D.

| Age. | A. | | | B. | | | C. | | | D. | | | Total No. examined. | Average Height. | Average Weight. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | No. | Ht. | Wt. | No. | Ht. | Wt. | No. | Ht. | Wt. | No. | Ht. | Wt. | | | |
| | | ins. | lbs. | | ins. | lbs. | | ins. | lbs. | | ins. | lbs. | | ins. | lbs. |
| 5 | 431 | 39·3 | 37·9 | 435 | 40·3 | 38·8 | 128 | 40·2 | 39·5 | 126 | 41·3 | 40·0 | 1,120 | 40·0 | 38·6 |
| 6 | 1,315 | 41·3 | 40·9 | 1,265 | 42·1 | 42·1 | 524 | 42·1 | 42·5 | 434 | 43·1 | 43·3 | 3,538 | 41·9 | 41·8 |
| 7 | 1,444 | 43·0 | 44·2 | 1,498 | 44·2 | 45·7 | 702 | 44·0 | 46·0 | 539 | 44·8 | 46·6 | 4,183 | 43·7 | 45·3 |
| 8 | 1,656 | 45·1 | 48·0 | 1,551 | 45·9 | 49·7 | 694 | 46·3 | 50·2 | 639 | 46·9 | 51·1 | 4,540 | 45·8 | 49·3 |
| 9 | 1,551 | 47·0 | 52·2 | 1,603 | 47·8 | 53·7 | 688 | 48·0 | 54·4 | 586 | 49·0 | 56·2 | 4,428 | 47·7 | 53·6 |
| 10 | 1,541 | 48·9 | 56·7 | 1,485 | 49·6 | 58·4 | 683 | 49·9 | 59·5 | 641 | 50·8 | 60·9 | 4,350 | 49·6 | 58·3 |
| 11 | 1,444 | 50·7 | 61·6 | 1,508 | 51·0 | 62·7 | 644 | 51·6 | 64·1 | 679 | 52·6 | 66·2 | 4,275 | 51·3 | 63·1 |
| 12 | 1,363 | 52·3 | 66·4 | 1,490 | 52·9 | 68·0 | 696 | 53·3 | 69·3 | 667 | 54·3 | 71·0 | 4,216 | 53·0 | 68·1 |
| 13 | 1,387 | 53·8 | 71·5 | 1,488 | 54·4 | 72·9 | 650 | 55·0 | 75·5 | 747 | 56·0 | 77·0 | 4,272 | 54·6 | 73·5 |
| 14 | 490 | 55·3 | 76·0 | 481 | 55·4 | 77·1 | 291 | 57·2 | 82·1 | 472 | 57·8 | 83·6 | 1,734 | 56·3 | 79·3 |
| 15 | 2 | 47·1 | 52·0 | 3 | 58·3 | 87·7 | 36 | 59·8 | 91·8 | 116 | 60·5 | 93·6 | 157 | 60·1 | 92·5 |
| 16 | — | — | — | 2 | 58·3 | 87·5 | 9 | 61·7 | 99·1 | 41 | 62·2 | 103·9 | 52 | 62·0 | 102·5 |
| 17 | — | — | — | 1 | 64·0 | 84·0 | 1 | 69·5 | 130·0 | 11 | 64·6 | 115·5 | 13 | 64·9 | 114·2 |
| 18 | — | — | — | 1 | 56·0 | 74·0 | — | — | — | 4 | 65·8 | 121·5 | 5 | 63·9 | 112·0 |

Group A. comprises "schools in the poorest districts of the city." Group B. comprises "schools in poor districts of the city." Group C. comprises "schools in districts of a better class." Group D. comprises "schools in districts of a still higher class, in whichis included four out of the five Higher Grade Schools in the city."

* Report on The Physical Condition of Children attending the Public Schools of the School Board for Glasgow (Cd. 3637, 1907).

## TABLE II. (*b*).

GIRLS' HEIGHTS (INCHES) AND WEIGHTS (LBS.).

School Group.

| Age. | A. | | | B. | | | C. | | | D. | | | Total No. of Children Examined. | Average Height. | Average Weight. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | No. | Ht. | Wt. | No. | Ht. | Wt. | No. | Ht. | Wt. | No. | Ht. | Wt. | | | |
| | | ins. | lbs. | | ins. | lbs. | | ins. | lbs. | | ins. | lbs. | | ins. | lbs. |
| 5 | 375 | 39·1 | 37·0 | 415 | 40·2 | 38·0 | 122 | 40·1 | 38·5 | 105 | 41·0 | 39·3 | 1,017 | 39·9 | 37·8 |
| 6 | 1,246 | 40·9 | 40·0 | 1,215 | 41·8 | 40·6 | 474 | 41·8 | 41·4 | 436 | 42·6 | 41·8 | 3,371 | 41·6 | 40·6 |
| 7 | 1,524 | 42·8 | 43·0 | 1,469 | 43·5 | 44·0 | 675 | 43·6 | 44·6 | 503 | 44·7 | 45·6 | 4,171 | 43·4 | 43·9 |
| 8 | 1,572 | 44·5 | 46·4 | 1,520 | 45·4 | 47·7 | 752 | 45·5 | 48·2 | 568 | 46·4 | 49·4 | 4,412 | 45·2 | 47·5 |
| 9 | 1,489 | 46·6 | 50·5 | 1,574 | 47·1 | 51·9 | 717 | 47·5 | 52·7 | 603 | 48·5 | 54·3 | 4,383 | 47·2 | 51·9 |
| 10 | 1,471 | 48·4 | 54·8 | 1,527 | 48·9 | 55·8 | 677 | 49·3 | 57·0 | 684 | 50·3 | 58·8 | 4,359 | 49·0 | 56·1 |
| 11 | 1,378 | 50·2 | 59·6 | 1,450 | 50·8 | 60·9 | 674 | 51·2 | 62·2 | 617 | 52·0 | 63·9 | 4,119 | 50·8 | 61·1 |
| 12 | 1,449 | 52·3 | 65·4 | 1,472 | 52·8 | 67·0 | 714 | 53·2 | 68·3 | 724 | 54·0 | 70·3 | 4,359 | 52·9 | 67·2 |
| 13 | 1,185 | 54·4 | 72·7 | 1,410 | 55·0 | 74·6 | 646 | 55·4 | 76·6 | 698 | 56·4 | 79·1 | 3,939 | 55·1 | 75·1 |
| 14 | 348 | 55·7 | 76·8 | 482 | 56·8 | 81·1 | 204 | 56·9 | 83·1 | 486 | 58·6 | 88·9 | 1,520 | 57·1 | 82·9 |
| 15 | — | — | — | 3 | 60·1 | 86·0 | 28 | 60·0 | 97·4 | 173 | 60·0 | 99·3 | 204 | 60·0 | 98·9 |
| 16 | — | — | — | — | — | — | 15 | 61·6 | 105·5 | 65 | 61·0 | 106·1 | 80 | 61·1 | 106·0 |
| 17 | — | — | — | — | — | — | 9 | 60·4 | 103·8 | 22 | 61·1 | 112·2 | 31 | 60·9 | 109·7 |
| 18 | — | — | — | — | — | — | — | — | — | 9 | 63·4 | 115·7 | 9 | 63·4 | 115·7 |

## TABLE III.

Heights and Weights of Glasgow School Children.*

Measurements (without Clothing) for each year of age.

| Age. | BOYS. | | | GIRLS. | | |
|---|---|---|---|---|---|---|
| | No. | Height in Inches. | Weight in Pounds. | No. | Height in Inches. | Weight in Pounds. |
| 6 | 41 | 41·632 | 39·193 | 38 | 41·970 | 37·842 |
| 7 | 44 | 45·400 | 46·267 | 51 | 44·775 | 43·719 |
| 8 | 35 | 47·266 | 49·060 | 38 | 46·641 | 45·662 |
| 9 | 39 | 49·342 | 51·911 | 45 | 48·555 | 51·859 |
| 10 | 41 | 50·593 | 57·411 | 47 | 49·518 | 54·870 |
| 11 | 46 | 52·154 | 60·736 | 42 | 51·797 | 62·279 |
| 12 | 42 | 53·271 | 65·328 | 43 | 54·114 | 65·553 |
| 13 | 63 | 55·669 | 74·406 | 52 | 55·856 | 75·777 |
| 14 | 11 | 54·994 | 72·212 | 11 | 54·945 | 72·456 |

## TABLE IV.

Heights and Weights of Dundee Elementary School Children.†

| Age. | BOYS. | | | GIRLS. | | |
|---|---|---|---|---|---|---|
| | No. | Height in Inches. | Weight in Pounds. | No. | Height in Inches. | Weight in Pounds. |
| 5 | 55 | 39·37 | 37·50 | 57 | 39·58 | 37·00 |
| 6 | 60 | 41·78 | 41·75 | 66§ | 41·34 | 41·00 |
| 7 | 54 | 44·19 | 45·50 | 58 | 44·19 | 45·62 |
| 8 | 57 | 46·06 | 49·50 | 58 | 45·47 | 47·25 |
| 9 | 60 | 48·82 | 57·50 | 57 | 48·23 | 55·50 |
| 10 | 58 | 49·90 | 59·87 | 61 | 49·41 | 58·25 |
| 11 | 61‡ | 51·38 | 62·75 | 57 | 52·56 | 64·50 |
| 12 | 60 | 52·90 | 68·62 | 68¶ | 53·25 | 67·50 |
| 13 | 43‖ | 54·53 | 74·25 | 33 | 55·32 | 75·00 |

* "Report of an Inquiry into the Physique of Glasgow School Children," 1904.

† Dundee Social Union. Report on Housing and Industrial Conditions in Dundee, 1905.

‡ 60 boys *weighed*.

‖ 41 boys *weighed*.

§ 67 girls *weighed*.

¶ 69 girls *weighed*.

# TABLE V.

HEIGHT AND WEIGHT OF EDINBURGH CHILDREN.*

| Age | BOYS. | | | GIRLS. | | |
|---|---|---|---|---|---|---|
| | No. | Height in Ins. | Weight in Lbs. | No. | Height in Ins. | Weight in Lbs. |
| 5 | 43 | 40·43 | 37·74 | 43 | 39·57 | 36·40 |
| 6 | 72 | 42·55 | 42·54 | 80 | 41·33 | 39·87 |
| 7 | 81 | 43·85 | 44·93 | 77 | 43·45 | 43·77 |
| 8 | 101 | 45·82 | 50·22 | 80 | 45·11 | 46·73 |
| 9 | 101 | 47·52 | 53·53 | 99 | 47·19 | 51·45 |
| 10 | 92 | 49·19 | 58·51 | 69 | 48·88 | 56·51 |
| 11 | 97 | 50·86 | 62·26 | 78 | 50·89 | 60·47 |
| 12 | 75 | 52·71 | 67·71 | 54 | 52·03 | 66·52 |
| 13 | 63 | 54·02 | 71·61 | 52 | 54·69 | 74·77 |
| 14 | 5 | 55·68 | 78·70 | 2 | 55·58 | 72·00 |

* Charity Organisation Society Report, 1906.

## TABLE VI.

The following table summarises Dr. Hall's examination of 2,704 Gentile and Jewish Board School children from 6 to 13 years of age :—

BOYS AND GIRLS (WHOLE SCHOOLS TAKEN).

| Board Schools. | Age. | Number Examined. | Average Weight. | Average Height. |
|---|---|---|---|---|
| | | | Lb. | In. |
| Good District Gentile School | 7 | 91 | 48·0 | 47·25 |
| Poor District Gentile School | | 62 | 45·5 | 44·75 |
| Good District Jews' School | | 75 | 47·0 | 46·50 |
| Poor District Jews' School | | 91 | 49·33 | 45·0 |
| Country School .. | | 57 | 49·0 | 47·0 |
| Good District Gentile School | 8 | 114 | 52·75 | 49·0 |
| Poor District Gentile School | | 113 | 50·25 | 44·75 |
| Good District Jews' School | | 102 | 53·0 | 48·50 |
| Poor District Jews' School | | 121 | 53·5 | 47·0 |
| Country School .. | | 65 | 52·0 | 49·0 |
| Good District Gentile School | 9 | 118 | 56·0 | 50·25 |
| Poor District Gentile School | | 97 | 51·5 | 47·25 |
| Good District Jews' School | | 86 | 56·75 | 49·75 |
| Poor District Jews' School | | 84 | 59·0 | 49·50 |
| Country School .. | | 74 | 54·25 | 50·50 |
| Good District Gentile School | 10 | 116 | 60·33 | 53·0 |
| Poor District Gentile School | | 100 | 57·75 | 50·0 |
| Good District Jews' School | | 94 | 62·33 | 52·75 |
| Poor District Jews' School | | 100 | 64·0 | 52·50 |
| Country School .. | | 63 | 60·50 | 52·50 |
| Good District Gentile School | 11 | 86 | 66·25 | 54·25 |
| Poor District Gentile School | | 120 | 61·50 | 51·50 |
| Good District Jews' School | | 79 | 66·0 | 53·75 |
| Poor District Jews' School | | 95 | 67·0 | 52·33 |
| Country School .. | | 62 | 64·0 | 53·50 |
| Good District Gentile School | 12 | 72 | 72·0 | 56·17 |
| Poor District Gentile School | | 127 | 69·0 | 53·75 |
| Good District Jews' School | | 71 | 77·0 | 56·50 |
| Poor District Jews' School | | 107 | 76·0 | 55·0 |
| Country School .. | | 62 | 75·0 | 56·0 |

| | Rickets. | Bad or backward teeth. |
|---|---|---|
| Good District Gentile School .. | 8 per cent. | 38 per cent. |
| Poor District Gentile School .. | 50 ,, | 60 ,, |
| Good District Jews' School .. .. | 5 ,, | 11 ,, |
| Poor District Jews' School .. .. | 7 ,, | 25 ,, |
| Country School .. .. .. | 11 ,, | 33 ,, |

The poor district Gentile schools and the poor district Jewish schools were taken from the poorest part of the City of Leeds.

The School Medical officers of the Holland and Lindsey Divisions of Lincolnshire have compiled the following table "from the figures supplied by the School Medical Officers of 17 County and 44 Urban Districts, embracing 587,635 children." *

## TABLE VII †

| Age last Birthday. | England. | | County Areas. | | Urban Areas. | | North of England | | South of England. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Ht. Ins. | Wt. Lbs. | Ht. Ins. | Wt. Lbs. | Ht. Ins | Wt. Lbs | Ht. Ins. | Wt. Lbs. | Ht. Ins. | Wt. Lbs. |
| BOYS. | | | | | | | | | | |
| 3 | 36·35 | 32·75 | 36·65 | 32·9 | 36·00 | 32·5 | 36·4 | 32·75 | 36·45 | 32·74 |
| 4 | 38·65 | 35·9 | 38·8 | 36·25 | 38·45 | 35·5 | 38·6 | 36·05 | 38·75 | 35·68 |
| 5 | 40·55 | 38·7 | 40·65 | 39·05 | 40·45 | 38·2 | 40·4 | 38·6 | 40·85 | 38·65 |
| 6 | 42·5 | 42·6 | 42·75 | 42·68 | 42·35 | 42·55 | 42·4 | 42·95 | 42·75 | 41·9 |
| 7 | 45·15 | 44·55 | 45·4 | 47·3 | 45·00 | 46·3 | 44·9 | 46·65 | 45·35 | 46·78 |
| 8 | 46·95 | 50·4 | 47·05 | 51·35 | 46·85 | 50·15 | 46·55 | 49·85 | 47·25 | 50·7 |
| 9 | 49·1 | 55·39 | 49·85 | 57·04 | 48·7 | 54·54 | 49·35 | 56·15 | 48·75 | 54·5 |
| 10 | 50·95 | 60·4 | 51·2 | 61·15 | 50·85 | 60·00 | 50·9 | 60·55 | 51·1 | 60·2 |
| 11 | 52·84 | 65·98 | 53·2 | 67·85 | 52·65 | 64·95 | 52·75 | 66·5 | 52·95 | 65·45 |
| 12 | 55·05 | 72·85 | 55·2 | 73·45 | 54·75 | 71·58 | 54·9 | 72·5 | 55·2 | 73·3 |
| 13 | 56·1 | 77·5 | 56·15 | 77·85 | 56·05 | 77·25 | 55·75 | 76·9 | 56·6 | 78·3 |
| 14 | 57·9 | 84·1 | 58·2 | 84·5 | 57·8 | 83·9 | 57·25 | 82·56 | 58·68 | 85·9 |
| GIRLS. | | | | | | | | | | |
| 3 | 36·05 | 31·85 | 36·17 | 32·0 | 35·8 | 31·5 | 36·02 | 32·32 | 36·1 | 31·74 |
| 4 | 38·65 | 34·88 | 39·05 | 35·1 | 38·08 | 34·6 | 38·5 | 34·86 | 38·83 | 34·92 |
| 5 | 40·4 | 37·6 | 40·6 | 37·91 | 40·16 | 37·3 | 40·15 | 37·44 | 40·86 | 38·05 |
| 6 | 42·36 | 40·98 | 42·52 | 41·31 | 42·2 | 40·65 | 42·13 | 40·83 | 42·75 | 41·24 |
| 7 | 44·85 | 45·2 | 45·12 | 45·5 | 44·65 | 44·98 | 44·45 | 45·1 | 45·2 | 45·25 |
| 8 | 46·29 | 48·94 | 46·35 | 49·0 | 46·25 | 48·9 | 46·12 | 48·7 | 46·5 | 49·19 |
| 9 | 48·7 | 54·59 | 49·45 | 55·35 | 48·25 | 54·15 | 48·9 | 54·95 | 48·38 | 54·5 |
| 10 | 51·1 | 58·9 | 51·28 | 59·39 | 50·95 | 58·58 | 50·86 | 58·64 | 51·6 | 59·6 |
| 11 | 52·55 | 65·24 | 53·39 | 66·84 | 52·1 | 64·3 | 52·6 | 65·24 | 52·52 | 65·24 |
| 12 | 54·68 | 73·89 | 54·55 | 74·6 | 54·85 | 72·3 | 54·6 | 73·32 | 54·65 | 74·6 |
| 13 | 56·9 | 80·0 | 57·12 | 81·1 | 56·7 | 79·23 | 56·58 | 79·55 | 57·32 | 80·69 |
| 14 | 58·66 | 87·75 | 58·98 | 88·45 | 58·55 | 87·4 | 58·15 | 87·98 | 59·34 | 89·94 |

* Report of School Medical Officer, Norfolk County Council, 1910, p. 16.

† Taken from Report of School Medical Officer, Middlesbrough, 1910, p. 25.

## TABLE VIII.

CHILDREN IN INSTITUTIONS.

[From Poor Law Commission, Appendix Volume 17.]

| Age. | BOYS. | | | GIRLS. | | |
|---|---|---|---|---|---|---|
| | No. exam. | Height. Ins. | Weight. Lbs. | No. exam. | Height. Ins. | Weight. Lbs. |
| 3 | 12 | 33·4 | 29·8 | 11 | 34·0 | 30·1 |
| 4 | 23 | 37·3 | 35·2 | 16 | 36·7 | 35·8 |
| 5 | 26 | 39·1 | 37·2 | 29 | 39·4 | 36·7 |
| 6 | 41 | 41·0 | 38·8 | 36 | 41·3 | 40·9 |
| 7 | 39 | 43·5 | 45·4 | 39 | 42·7 | 44·7 |
| 8 | 48 | 45·1 | 48·3 | 53 | 43·8 | 47·4 |
| 9 | 45 | 46·5 | 52·0 | 53 | 46·7 | 51·8 |
| 10 | 47 | 48·9 | 59·5 | 55 | 48·1 | 57·0 |
| 11 | 69 | 50·2 | 61·3 | 59 | 51·3 | 66·2 |
| 12 | 68 | 51·1 | 66·4 | 61 | 52·9 | 70·4 |
| 13 | 53 | 53·6 | 73·5 | 53 | 54·9 | 82·3 |
| 14 | 38 | 54·7 | 76·4 | 36 | 55·6 | 90·5 |

## TABLE IX.

OUT RELIEF CHILDREN.

[From Poor Law Commission, Appendix Volume 17.]

| Age. | BOYS. | | | GIRLS. | | |
|---|---|---|---|---|---|---|
| | No. exam. | Height. Ins. | Weight. Lbs. | No. exam. | Height. Ins. | Weight. Lbs. |
| 3 | 18 | 36·2 | 35·8 | 5 | 35·2 | 29·9 |
| 4 | 36 | 33·6 | 35·4 | 35 | 38·9 | 36·7 |
| 5 | 36 | 39·8 | 39·1 | 54 | 40·2 | 37·5 |
| 6 | 56 | 42·3 | 42·0 | 81 | 42·0 | 40·4 |
| 7 | 72 | 44·5 | 46·3 | 72 | 43·6 | 44·3 |
| 8 | 79 | 46·2 | 50·3 | 83 | 46·5 | 48·9 |
| 9 | 90 | 47·9 | 55·6 | 85 | 48·1 | 52·3 |
| 10 | 90 | 50·0 | 59·6 | 90 | 50·7 | 60·2 |
| 11 | 70 | 50·1 | 64·9 | 105 | 52·2 | 62·9 |
| 12 | 73 | 52·8 | 70·3 | 64 | 54·9 | 71·9 |
| 13 | 49 | 55·4 | 75·8 | 67 | 56·4 | 79·4 |
| 14 | 4 | 55·3 | 74·2 | 9 | 57·0 | 84·8 |

## TABLE X.

American Statistics obtained by Boas, based upon investigations made in Boston, St. Louis, Milwaukee, Worcester, Toronto, and Oakland.*

| Approximate Average Age. | BOYS. | | | GIRLS. | | |
|---|---|---|---|---|---|---|
| | No. of Observations. | Average Height. Ins. | Per Centage Annual Increase. | No. of Observations. | Average Height. Ins. | Per Centage Annual Increase. |
| 5½ | 1,535 | 41·7 | — | 1,260 | 41·3 | — |
| 6½ | 3,975 | 43·9 | 5·3 | 3,618 | 43·3 | 4·8 |
| 7½ | 5,379 | 46·0 | 4·8 | 4,913 | 45·7 | 5·5 |
| 8½ | 5,633 | 48·8 | 6·1 | 5,289 | 47·7 | 4·4 |
| 9½ | 5,531 | 50·0 | 2·5 | 5,132 | 49·7 | 4·2 |
| 10½ | 5,151 | 51·9 | 3·8 | 4,827 | 51·7 | 4·0 |
| 11½ | 4,759 | 53·6 | 3·3 | 4,507 | 53·8 | 4·1 |
| 12½ | 4,205 | 55·4 | 3·4 | 4,187 | 56·1 | 4·3 |
| 13½ | 3,573 | 57·5 | 3·8 | 3,411 | 58·5 | 4·3 |
| 14½ | 2,518 | 60·0 | 4·3 | 2,537 | 60·4 | 3·2 |
| 15½ | 1,481 | 62·9 | 4·8 | 1,656 | 61·6 | 2·0 |

## TABLE XI.

American Statistics obtained by Burk, relating to Children of Boston, St. Louis, and Milwaukee.†

| Age. | BOYS. | | GIRLS. | |
|---|---|---|---|---|
| | Average Weight. Lbs. | Per Centage Annual Increase. | Average Weight. Lbs. | Per Centage Annual Increase. |
| 6½ | 45·2 | — | 43·4 | — |
| 7½ | 49·5 | 9·5 | 47·7 | 9·9 |
| 8½ | 54·5 | 10·1 | 52·5 | 10·0 |
| 9½ | 59·6 | 9·3 | 57·4 | 9·3 |
| 10½ | 65·4 | 9·7 | 62·9 | 9·6 |
| 11½ | 70·7 | 8·1 | 69·5 | 10·5 |
| 12½ | 76·9 | 8·7 | 78·7 | 13·2 |
| 13½ | 84·8 | 10·3 | 88·7 | 12·7 |
| 14½ | 95·2 | 12·3 | 98·3 | 11·9 |
| 15½ | 107·4 | 12·8 | 106·7 | 8·5 |

* Taken from G. Stanley Hall's "Adolescence," Vol. I., p. 7.
† From G. Stanley Hall's "Adolescence," Vol. I., p. 8.

## TABLE XII.

### LIVERPOOL CHILDREN.*

Dr. A. S. Arkle's Paper on the Medical Inspection of School Children. (North of England Education Conference, 1907).

| Age. | BOYS. | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Heights. Ins. | | | | | Weights. Lbs. | | | | |
| | Secondary Schools. | Council Schools. "A." | Council Schools. "B." | Council Schools. "C." | Industrial Schools. | Secondary Schools. | Council Schools. "A." | Council Schools. "B." | Council Schools. "C." | Industrial Schools. |
| 6 | — | — | 43·25 | — | 39·0 | — | — | 37·0 | — | 41·0 |
| 7 | 47·4 | 45·33 | 44·8 | 44·0 | 45·25 | 49·3 | 44·1 | 43·0 | 43·0 | 46·75 |
| 8 | 50·61 | 47·67 | 46·0 | 44·37 | 46·3 | 56·7 | 48·44 | 47·64 | 43·87 | 49·5 |
| 9 | 52·03 | 49·76 | 48·8 | 47·0 | 46·3 | 59·5 | 53·83 | 50·85 | 76·33 | 53·5 |
| 10 | 54·41 | 51·3 | 49·7 | 48·5 | 49·12 | 66·03 | 55·1 | 53·0 | — | — |
| 11 | 55·5 | 53·11 | 51·8 | 49·75 | 52·04 | 70·27 | 61·45 | 59·05 | 55·3 | 55·81 |
| 12 | 58·0 | 54·9 | 53·6 | 51·6 | 53·0 | 77·05 | 66·6 | 63·92 | 62·05 | 68·0 |
| 13 | 60·55 | 57·05 | 53·9 | 53·61 | 54·41 | 88·25 | 73·42 | 68·75 | 69·33 | 73·0 |
| 14 | 61·75 | 58·2 | 56·25 | 55·25 | — | 94·5 | 75·82 | 75·87 | 71·14 | — |
| 15 | 65·43 | 62·75 | 55·25 | — | — | 108·3 | 96·3 | 65·0 | — | — |
| | GIRLS. | | | | | | | | | |
| 7 | — | 46·75 | 44·25 | 45·12 | 43·7 | — | 43·0 | 41·1 | 47·0 | 40·0 |
| 8 | — | 47·5 | 46·73 | 44·87 | 42·25 | — | 48·85 | 45·9 | 44·16 | 38·3 |
| 9 | — | 5[illegible]62 | 48·25 | 47·16 | 44·25 | — | 52·0 | 49·9 | 48·5 | 42·4 |
| 10 | — | 51·25 | 49·76 | 48·17 | 48·3 | — | 57·5 | 54·3 | 52·75 | 51·3 |
| 11 | — | 53·0 | 52·12 | 49·06 | 49·05 | — | 61·28 | 62·5 | 56·25 | 60·6 |
| 12 | — | 55·25 | 53·7 | 52·16 | — | — | 71·31 | 67·07 | 67·7 | — |
| 13 | — | 56·3 | 55·3 | 55·5 | — | — | 70·3 | 73·16 | 73·3 | 67·0 |
| 14 | — | 60·5 | 53·7 | 56·5 | — | — | 93·3 | 74·57 | 82·0 | — |
| 15 | — | 60·25 | — | — | — | — | 93·45 | — | — | — |

* See above p. 49 for explanation of classification of Council Schools.

A Summary is given below of the statements relating to the physique of "half-time" school children contained in the Appendices to the Report of the Inter-departmental Committee on Partial Exemption from school attendance, Vol. II. (Cd. 4887. 1909).

## TABLE XIII. (*a*).

(From Appendix XIV.).

BOLTON CHILDREN.

BOYS.

| Full-time Scholars. | | | | Half-time Scholars. | | | | |
|---|---|---|---|---|---|---|---|---|
| No. of children. | Age (Y & M.) | Height (ins.) | Weight (lbs.) | No. of children. | Length of time, working months. | Age (Y & M.) | Height (ins.) | Weight (lbs.) |
| 42 | 12y.6m. | 55·5 | 74·25 | 42 | 6 | 12y.6m. | 55 | 73 |
| 40 | 12y.9m. | 55·25 | 76 | 40 | 9 | 12y.9m. | 55 | 74 |
| 39 | 12y.10m. | 55·5 | 73·5 | 39 | 10 | 12y.10m. | 54·5 | 69·75 |
| 32 | 12y.11m. | 56 | 74·75 | 32 | 11 | 12y.11m. | 54·5 | 73 |
| 32 | 13 to 14 years. | 57·5 | 81·5 | 32 | a year or more. | 13 to 14 years. | 56·5 | 78·75 |

GIRLS.

| No. of children. | Age. (Y. & M.) | Height (ins.) | Weight (lbs.) | No. of children. | Age. (Y. & M.) | Height (ins.) | Weight (lbs.) |
|---|---|---|---|---|---|---|---|
| 60 | 12y. 2m.–12y. 3m. | 53·875 | 68·125 | 60 | 12y. 2m.–12y. 3m. | 53·125 | 67·75 |
| 78 | 12y. 4m.–12y. 6m. | 54·125 | 69·75 | 78 | 12y. 4m.–12y. 6m. | 54·125 | 70·1 |
| 116 | 12y. 7m.–12y. 9m. | 54·875 | 71·8 | 116 | 12y. 7m.–12y. 9m. | 53·375 | 69·875 |
| 77 | 12y.10m.–13 years | 55·375 | 75 | 77 | 12y.10m.–13 years | 55·125 | 73·3 |
| 43 | 13 to 14 years | 55·125 | 78·25 | 43 | 13 to 14 years | 56 | 77·9 |

## TABLE XIII. (*b*).

HALIFAX CHILDREN. (Appendix XV.).

Statistics of 20 boys in full attendance at school, and 20 "half-timers" from the same school.

| Date. | Full attendance. Height (ins.) | Full attendance. Weight (lbs.) | Full attendance. Chest (ins.) | Half-time. Height (ins.) | Half-time. Weight (lbs.) | Half-time. Chest (ins.) |
|---|---|---|---|---|---|---|
| March, 1908 .. | 53·7 | 70·4 | 26·8 | 52·41 | 68·65 | 26·67 |
| Oct., 1908 .. | 54·5 | 75·1 | 27·6 | 53·47 | 69·25 | 26·80 |
| Average increase | ·87 | 4·67 | ·76 | 1·06 | ·60 | ·19 |

## TABLE XIII. (*c*).

BLACKBURN CHILDREN. (Appendix XVI.).

| | Age 12. | | | Age 13. | | |
|---|---|---|---|---|---|---|
| | No. examined. | Height (ins.) | Weight (lbs.) | No. examined. | Height (ins.) | Weight (lbs.) |
| | BOYS. | | | | | |
| Half-timers (in cotton industry) .. .. | 257 | 53·7 | 71·6 | 37 | 54·7 | 77·1 |
| Half-timers (in other industries) .. .. | 40 | 54·1 | 74·7 | 13 | 55·1 | 77·2 |
| Non-Half-timers .. | 46 | 53·2 | 68·0 | 18 | 56·4 | 79·9 |
| Non-Half-timers (higher grade schools) .. | 41 | 55·7 | 74·1 | 30 | 56·8 | 81·5 |
| | GIRLS. | | | | | |
| Half-timers (in Cotton industry) .. .. | 232 | 54·3 | 73·3 | 68 | 56·7 | 82·3 |
| Half-timers (in other industries) .. .. | 12 | 54·3 | 71·4 | 14 | 54·8 | 85·9 |
| Non-Half-timers .. | 35 | 53·9 | 69·4 | 26 | 54·0 | 71·0 |
| Non-Half-timers (higher grade schools) .. .. | 29 | 55·4 | 75·7 | 23 | 57·0 | 82·8 |

Appendix VIII. of the same report gives the detailed results of an enquiry amongst Halifax headmasters as to the effects of half-time. On the point of health and physique the views expressed are conflictory. On the whole, the opinion appears to be that the half-timers become less healthy in appearance, though a number of headmasters state that no injurious effects on physique are noticeable.

## TABLE XIV.

PHYSIQUE OF SCOTTISH SCHOOL CHILDREN.*

| Age. | No of Children. | Boys. Height. (Ins.) | Boys. Weight. (Lbs.) | No. of Children. | Girls. Height. (Ins.) | Girls. Weight. (Lbs.) |
|---|---|---|---|---|---|---|
| | | | Edinburgh. | | | |
| 6 | | 43·36 | 43·63 | | 42·82 | 42·38 |
| 7 | 100 | 44·40 | 46·84 | 99 | 44·33 | 45·24 |
| 8 | | 45·81 | 49·33 | | 46·40 | 49·25 |
| 9 | | 48·11 | 54·83 | | 47·58 | 51·94 |
| 10 | 101 | 50·78 | 60·60 | 99 | 49·68 | 58·06 |
| 11 | | 51·70 | 63·18 | | 52·53 | 63·27 |
| 12 | | 53·91 | 69·52 | | 53·58 | 70·03 |
| 13 | 88 | 55·88 | 75·61 | 99 | 56·29 | 78·56 |
| 14† | | 56·08 | 77·36 | | 59·37 | 99·22 |
| | | | Aberdeen. | | | |
| 6 | 32 | 44·3 | 46·9 | — | 43·7 | 45·4 |
| 7 | 33 | 46·2 | 51·3 | — | 45·8 | 48·4 |
| 8 | 34 | 47·3 | 54·9 | — | 46·5 | 50·0 |
| 9 | 33 | 49·0 | 58·9 | — | 49·4 | 55·7 |
| 10 | 34 | 51·1 | 62·8 | — | 50·5 | 61·4 |
| 11 | 33 | 53·6 | 70·2 | — | 52·9 | 65·5 |
| 12 | 35 | 55·8 | 77·3 | — | 54·9 | 72·7 |
| 13 | 34 | 56·6 | 80·6 | — | 57·0 | 82·8 |
| 14 | 32 | 59·9 | 95·7 | — | 60·4 | 94·5 |

Weights given above are *without* boots.

## APPENDIX D.

### THE PHYSIQUE OF POOR CHILDREN.

The writer, who for some time was connected with the Leeds Poor Children's Holiday Camp Association, analysed some of the statistics of the Association, which are presented below. The Society possesses a "camp," consisting of a one-storey building on the shores of Morecambe Bay, to which, during five or six months of the year, batches of about sixty children are sent for a fortnight. Both prior to their departure and on their return they are weighed, and it is interesting to observe that the average increase in weight (in a fortnight) is from two to two-and-a-half

* Report of the Royal Commission on Physical Training (Scotland) Cd. 1507, 1903), Appendix IX., pp. 86 and 112.

† Small numbers examined aged fourteen.

pounds—equivalent to something like five or six months' normal growth, which may be attributed to the combined influence of adequate and wholesome food, regular and sufficient sleep, and sea and mountain air.

The children all come from poor homes, where, for the time being, the total family income is, on the average, considerably under £1. They may be broadly divided into two groups: (1) the "permanently poor" and (2) "the temporarily poor," the latter as a rule being easily distinguishable by their personal appearance. The following observations which were taken by the writer personally, relate to children between the ages of 8 and 13, there being but very few boys and girls below 8 or over 13 sent away.

## TABLE I.

### Leeds Poor Children.

| Age. | Boys. | | | Girls. | | |
|---|---|---|---|---|---|---|
| | No. of Observations. | Height. (Ins.) | Weight. (Lbs.) | No. of Observations. | Height. (Ins.) | Weight. (Lbs.) |
| 8 | 81 | 46·3 | 48·2 | 100 | 45·0 | 47·1 |
| 9 | 97 | 47·0 | 51·4 | 101 | 46·6 | 51·0 |
| 10 | 113 | 49·0 | 56·0 | 116 | 48·0 | 55·1 |
| 11 | 121 | 51·3 | 59·8 | 96 | 49·6 | 59·2 |
| 12 | 114 | 51·8 | 63·5 | 97 | 52·5 | 67·0 |
| 13 | 34 | 53·0 | 67·4 | 35 | 53·5 | 73·5 |
| Total | 560 | — | — | 545 | — | — |

The significance of these figures is more fully seen in the table below, which gives the index numbers for heights and weights at each age, together with the $\frac{W}{H}$ index and the value of $\frac{100 \sqrt[3]{W} \text{ (kgms.)}}{H \text{ (cms.)}}$

## TABLE II.

### Leeds Poor Children.

| Age. | Boys. | | | | Girls. | | | |
|---|---|---|---|---|---|---|---|---|
| | Index Nos. B.H. | Index Nos. B.W. | $\frac{W \text{ (lbs.)}}{H \text{ (ins.)}}$ | $\frac{100 \sqrt[3]{W}}{H}$ | Index Nos. G.H. | Index Nos. G.W. | $\frac{W}{H}$ | $\frac{100 \sqrt[3]{W}}{H}$ |
| 8 | 97·7 | 92·7 | 1·041 | 2·378 | 95·9 | 95·0 | 1·047 | 2·428 |
| 9 | 95·5 | 92·0 | 1·094 | 2·392 | 95·7 | 94·3 | 1·094 | 2·407 |
| 10 | 96·6 | 92·7 | 1·143 | 2·362 | 94·9 | 93·9 | 1·148 | 2·399 |
| 11 | 96·8 | 90·1 | 1·166 | 2·306 | 93·6 | 90·4 | 1·194 | 2·377 |
| 12 | 94·4 | 87·3 | 1·226 | 2·330 | 94·6 | 90·7 | 1·276 | 2·341 |
| 13 | 94·5 | 87·1 | 1·272 | 2·323 | 94·2 | 91·4 | 1·374 | 2·332 |

The numerical values in Table II. are expressed graphically in Chart VIII. It seems clear from the percentage index numbers, especially in the case of boys, that there is deterioration at the higher ages. There is some irregularity in the decline from the normal ; this, however, may be eliminated and the general trend of the index numbers shown by taking averages of three years of age, as follows :

TABLE III,

INDEX NUMBERS.

| Ages. | B.H. | B.W. | G.H. | G.W. |
|---|---|---|---|---|
| Average of 8, 9, and 10 years .. | 96·6 | 92·5 | 95·5 | 94·4 |
| ,, ,, 9, 10, and 11 years .. | 96·3 | 91·6 | 94·7 | 92·9 |
| ,, ,, 10, 11, and 12 years .. | 95·9 | 90·0 | 94·3 | 91·7 |
| ,, ,, 11, 12, and 13 years .. | 95·2 | 88·2 | 94·1 | 90·8 |

In the above Table the tendency for the poor children to sink further and further below the average in both height and weight as they grow older is made quite clear.

This conclusion bears out the contention of Dr. Arkle regarding the progressive deterioration of poor children,* and though the school medical officers' statistics relating to children in "poor" schools, dealt with in Chapter IV., show no similar tendency, the figures are none the less very significant. In the case of the statistics of children in poor schools, it may be that the schools chosen varied in the degree of poverty, and that in all of them there would be a proportion (varying in the different schools) of children who could not really be classed as "poor." The effect of this would be to obscure any increasing decline from the average that might otherwise be observable. In the case of Leeds poor children, there are included a number of children who had only recently been plunged into poverty, and who were, generally speaking, fairly well nourished, so that the deterioration even there is somewhat hidden.

It will be observed that relatively to the boys, the poor girls are shorter and heavier, yet on the whole the index numbers for boys' heights are higher than the index numbers for girls' heights ; but the girls' weight index numbers are higher than the weight index numbers for boys. This explains the higher value of $\frac{W}{H}$ for the girls than for the boys. The $\frac{100^3 W}{H}$ index of nutrition, however, appears to show that the former are on the whole inferior to the latter. Both sets of index numbers exhibit a deviation of the poor children from the average.

* North of England Education Conference, 1907.

In conclusion, the test of percentage growth may be applied as supplying strong evidence of under-development, and of the effects of poverty.

TABLE IV.

PERCENTAGE GROWTH BETWEEN THE AGES OF 8 AND 13.

| | Leeds Poor Children. % | England and Wales. % | Leeds Poor Children Index. | England and Wales. Index. |
|---|---|---|---|---|
| Boys' Heights .. .. | 14·5 | 18·3 | 79 | 100 |
| „ Weights .. .. | 39·8 | 48·7 | 81 | 100 |
| Girls' Heights .. .. | 18·9 | 21·0 | 90 | 100 |
| „ Weights .. .. | 56·1 | 62·2 | 90 | 100 |

It will be observed that whilst the rate of growth of girls between 8 and 13 years of age is about 10 per cent. less than the average, in the case of boys it is no less than 20 per cent. below.

On the whole, the evidence seems to show that the physique of the poor Leeds boys has suffered more severely from the effects of poverty than has that of girls.

P. S. KING & SON, ORCHARD HOUSE, WESTMINSTER.